City of San Diego

CONTRACTOR'S NAME: Act 1 Construction, Inc.
ADDRESS: 444 Sixth Street, Norco, CA 92860
TELEPHONE NO.: 951-735-1184 **FAX NO.:**
CITY CONTACT: Brittany Friedenreich, Contract Specialist, Email: BFriedenreic@sandiego.gov
Phone No. (619) 533-3104, Fax No. (619) 533-3633
J. Acevedo/ RBustamante/ mlw

BIDDING DOCUMENTS

e - Bidding

FOR

MISSION TRAILS FIELD STATION EAST FORTUNA

BID NO.: **K-18-1578-DBB-3**
SAP NO. (WBS/IO/CC): **S-14016**
CLIENT DEPARTMENT: **1714**
COUNCIL DISTRICT: **7**
PROJECT TYPE: **BH**

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
FEBRUARY 21, 2018
CITY OF SAN DIEGO
PUBLIC WORKS CONTRACTS
1010 SECOND AVENUE, 14th FLOOR, MS 614C
SAN DIEGO, CA 92101

ENGINEER OF WORK

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

1) Registered Architect — 1.5.2018 — Date — Seal:

2) For City Engineer — 1/5/18 — Date — Seal

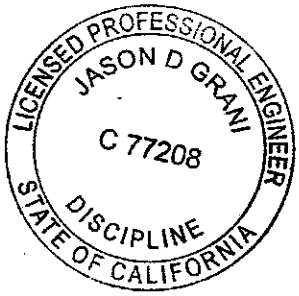

TABLE OF CONTENTS

NOTICE INVITING BIDS

1. **SUMMARY OF WORK:** This is the City of San Diego's (City) solicitation process to acquire Construction services for **Mission Trails Field Station East Fortuna.** 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 **$3,900,000.**

4. **BID DUE DATE AND TIME ARE: FEBRUARY 21, 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 is 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 **2.7%**
2. ELBE participation **6.0%**
3. Total mandatory participation **8.7%**

7.2. The Bid may be declared non-responsive if the Bidder fails to meet the following requirements:

7.2.1. Include SLBE-ELBE certified subcontractors at the overall mandatory participation percentage identified in this document; **OR**

7.2.2. 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 MEETING:

8.1. Prospective Bidders are **encouraged** to attend the Pre-Bid Meeting. The purpose of the meeting is to discuss the scope of the Project, submittal requirements, the pre-qualification process and any Equal Opportunity Contracting Program requirements and reporting procedures. 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 meeting is scheduled as follows:

Date: **January 30, 2018**
Time: **10:00 AM**
Location: **1010 Second Avenue, Suite 1400, (Large Conf. Room), San Diego, CA 92101**

Attendance at the Pre-Bid Meeting will be evidenced by the Bidder's representative's signature on the attendance roster. It is the responsibility of the Bidder's representative to complete and sign the attendance roster.

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 a Bid, the City will prepare contract documents for execution within approximately 21 days of the date of the Bid opening. The City will then award the Contract within approximately 14 days of 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 the City Attorney's Office.

9.4. The low Bid will be determined by the 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 Public Works Department is the officer responsible for opening, examining, and evaluating the competitive Bids submitted to the City for the acquisition, construction and completion of any public improvement except when otherwise set forth in these documents. Any questions related to this solicitation shall be submitted to:

Public Works Contracts
1010 Second Avenue, 14th Floor
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.

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. For additional information or the answer to questions about the prequalification program, contact David Stucky at 619-533-3474 or dstucky@sandiego.gov.

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 and 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, EOCP 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 (90 days for federally funded contracts and contracts valued at $500,000 or less) 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	PWPIO92816-07
NOTE: *Available online under Engineering Documents and References at: http://www.sandiego.gov/publicworks/edocref/index.shtml		

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 ACCCEPTED: 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.

Bond Number: 54-220110
Premium: $47,235.00
Premium is for contract term and subject to adjustment based on final contract price

PERFORMANCE BOND, LABOR AND MATERIALMEN'S BOND

FAITHFUL PERFORMANCE BOND AND LABOR AND MATERIALMEN'S BOND:

Act 1 Construction, Inc., a corporation, as principal, and United Fire & Casualty 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 **Four Million Nine Hundred Ninety Eight Thousand Dollars and Zero Cents ($4,998,000.00)** for the faithful performance of the annexed contract, and in the sum of **Four Million Nine Hundred Ninety Eight Thousand Dollars and Zero Cents ($4,998,000.00)** 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 April 26th, 2018

Approved as to Form

Mara W. Elliott, City Attorney

By _____

Deputy City Attorney

Act 1 Construction, Inc.

Principal

By _____

Tiffany Trenholm

Printed Name of Person Signing for Principal

United Fire & Casualty Company

Surety

By _____

Michael R. Strahan
Attorney-in-fact

Approved:

By _____

Stephen Samara
Principal Contract Specialist
Public Works Contracts

1620 5th Ave, Ste 340

Local Address of Surety

San Diego, CA 92101

Local Address (City, State) of Surety

858-538-8822

Local Telephone No. of Surety

Premium $ 47,235.00

Bond No. 54-220110

UNITED FIRE & CASUALTY COMPANY, CEDAR RAPIDS, IA
UNITED FIRE & INDEMNITY COMPANY, WEBSTER, TX
FINANCIAL PACIFIC INSURANCE COMPANY, ROCKLIN, CA
CERTIFIED COPY OF POWER OF ATTORNEY
(original on file at Home Office of Company – See Certification)

Inquiries: Surety Department
118 Second Ave SE
Cedar Rapids, IA 52401

KNOW ALL PERSONS BY THESE PRESENTS, That UNITED FIRE & CASUALTY COMPANY, a corporation duly organized and existing under the laws of the State of Iowa; UNITED FIRE & INDEMNITY COMPANY, a corporation duly organized and existing under the laws of the State of Texas; and FINANCIAL PACIFIC INSURANCE COMPANY, a corporation duly organized and existing under the laws of the State of California (herein collectively called the Companies), and having their corporate headquarters in Cedar Rapids, State of Iowa, does make, constitute and appoint
MICHAEL R. STRAHAN, ELBA MCCULLOUGH, E.B. STRAHAN, EACH INDIVIDUALLY of SAN DIEGO CA

their true and lawful Attorney(s)-in-Fact with power and authority hereby conferred to sign, seal and execute in its behalf all lawful bonds, undertakings and other obligatory instruments of similar nature provided that no single obligation shall exceed $50,000,000.00 and to bind the Companies thereby as fully and to the same extent as if such instruments were signed by the duly authorized officers of the Companies and all of the acts of said Attorney, pursuant to the authority hereby given and hereby ratified and confirmed.

The Authority hereby granted shall expire the 8th day of August, 2018 unless sooner revoked by UNITED FIRE & CASUALTY COMPANY, UNITED FIRE & INDEMNITY COMPANY, AND FINANCIAL PACIFIC INSURANCE COMPANY.

This Power of Attorney is made and executed pursuant to and by authority of the following bylaw duly adopted on May 15, 2013, by the Boards of Directors of UNITED FIRE & CASUALTY COMPANY, UNITED FIRE & INDEMNITY COMPANY, and FINANCIAL PACIFIC INSURANCE COMPANY.

"Article VI – Surety Bonds and Undertakings"

Section 2, Appointment of Attorney-in-Fact. "The President or any Vice President, or any other officer of the Companies may, from time to time, appoint by written certificates attorneys-in-fact to act in behalf of the Companies in the execution of policies of insurance, bonds, undertakings and other obligatory instruments of like nature. The signature of any officer authorized hereby, and the Corporate seal, may be affixed by facsimile to any power of attorney or special power of attorney or certification of either authorized hereby; such signature and seal, when so used, being adopted by the Companies as the original signature of such officer and the original seal of the Companies, to be valid and binding upon the Companies with the same force and effect as though manually affixed. Such attorneys-in-fact, subject to the limitations set forth in their respective certificates of authority shall have full power to bind the Companies by their signature and execution of any such instruments and to attach the seal of the Companies thereto. The President or any Vice President, the Board of Directors or any other officer of the Companies may at any time revoke all power and authority previously given to any attorney-in-fact.

IN WITNESS WHEREOF, the COMPANIES have each caused these presents to be signed by its vice president and its corporate seal to be hereto affixed this 8th day of August, 2016

UNITED FIRE & CASUALTY COMPANY
UNITED FIRE & INDEMNITY COMPANY
FINANCIAL PACIFIC INSURANCE COMPANY

By: Dennis J. Richmann Vice President

State of Iowa, County of Linn, ss:
On 8th day of August, 2016, before me personally came Dennis J. Richmann to me known, who being by me duly sworn, did depose and say; that he resides in Cedar Rapids, State of Iowa; that he is a Vice President of UNITED FIRE & CASUALTY COMPANY, a Vice President of UNITED FIRE & INDEMNITY COMPANY, and a Vice President of FINANCIAL PACIFIC INSURANCE COMPANY the corporations described in and which executed the above instrument; that he knows the seal of said corporations; that the seal affixed to the said instrument is such corporate seal; that it was so affixed pursuant to authority given by the Board of Directors of said corporations and that he signed his name thereto pursuant to like authority, and acknowledges same to be the act and deed of said corporations.

Judith A. Davis
Iowa Notarial Seal
Commission number 173041
My Commission Expires 04/23/2018

Judith A Davis Notary Public
My commission expires: 04/23/2018

I, David A. Lange, Secretary of UNITED FIRE & CASUALTY COMPANY and Assistant Secretary of UNITED FIRE & INDEMNITY COMPANY, and Assistant Secretary of FINANCIAL PACIFIC INSURANCE COMPANY, do hereby certify that I have compared the foregoing copy of the Power of Attorney and affidavit, and the copy of the Section of the bylaws and resolutions of said Corporations as set forth in said Power of Attorney, with the ORIGINALS ON FILE IN THE HOME OFFICE OF SAID CORPORATIONS, and that the same are correct transcripts thereof, and of the whole of the said originals, and that the said Power of Attorney has not been revoked and is now in full force and effect.

In testimony whereof I have hereunto subscribed my name and affixed the corporate seal of the said Corporations this 26th day of April, 2018.

By: David A. Lange

Secretary, UF&C
Assistant Secretary, UF&I/FPIC

BPOA0045 0115

ACKNOWLEDGMENT

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 April 26th 2018 before me, E.B. Strahan, Notary Public
(insert name and title of the officer)

personally appeared Michael R. Strahan,
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 _____ (Seal)

E. B. STRAHAN
Commission # 2069654
Notary Public - California
San Diego County
My Comm. Expires Jun 25, 2018

CALIFORNIA CERTIFICATE OF ACKNOWLEDGMENT

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 Riverside)

On April 27, 2018 before me, Cheri L. Bower, Notary Public,
(here insert name and title of the officer)

personally appeared Tiffany Trenholm ----------

---

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.

CHERI L. BOWER
COMM. #2122568
Notary Public - California
Riverside County
My Comm. Expires Aug. 8, 2019

Signature Cheri L. Bower, Notary Public

(Seal)

Optional Information

Although the information in this section is not required by law, it could prevent fraudulent removal and reattachment of this acknowledgment to an unauthorized document and may prove useful to persons relying on the attached document.

Description of Attached Document

The preceding Certificate of Acknowledgment is attached to a document titled/for the purpose of Performance Bond, Labor and Materialmen's Bond Mission Trails Field Station East Fortuna, containing 2 pages, and dated April 26, 2018.

The signer(s) capacity or authority is/are as:

- ☐ Individual(s)
- ☐ Attorney-in-Fact
- ☒ Corporate Officer(s) VP/Sec
  Title(s)
- ☐ Guardian/Conservator
- ☐ Partner - Limited/General
- ☐ Trustee(s)
- ☐ Other:

representing: Act 1 Construction, Inc.
Name(s) of Person(s) or Entity(ies) Signer is Representing

Additional Information

Method of Signer Identification

Proved to me on the basis of satisfactory evidence:
☒ form(s) of identification ○ credible witness(es)

Notarial event is detailed in notary journal on:
Page # _____ Entry # _____

Notary contact: _____

Other

☐ Additional Signer(s) ☐ Signer(s) Thumbprint(s)

☐ _____

ATTACHMENTS

ATTACHMENT A

SCOPE OF WORK

SCOPE OF WORK

1. **SCOPE OF WORK:** New construction of a single-story administration and community building on an existing vacant lot. Structure to consist of masonry walls, standing seam metal roof, interior partitions, enclosed office space, lobby, reception area, meeting rooms, equipment yard, garage, outdoor covered gathering area, and parking. HVAC, interior/exterior lighting, landscaping, and a fire suppression system to be incorporated.

1.1. The Work shall be performed in accordance with:

1.1.1. The Notice Inviting Bids and Plans numbered **39038-1-D** through **39038-123-D**, inclusive.

2. **ESTIMATED CONSTRUCTION COST:** The City's estimated construction cost for this project is **$3,900,000**.

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

14450 Equestrian Circle, San Diego, CA, 92071.

4. **CONTRACT TIME:** The Contract Time for completion of the Work, including the Plant Establishment Period, shall be **320 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 sections1810 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 3:30 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. The self-performance percentage requirement will be waived for Prime Contractors meeting the Class B License requirement of this Contract.

2-5.3.4 **Supporting Information.** To the "WHITEBOOK"**,** ADD the following:

2. For landscaping and irrigation materials, submit samples and test results to the Engineer within 15 Days of the NTP.

2-7 **SUBSURFACE DATA.** To the "WHITEBOOK", ADD the following:

4. In preparation of the Contract Documents, the designer has relied upon the following reports of explorations and tests of subsurface conditions at the Work Site:

   1. Report of Geotechnical Evaluation dated August 11, 2015 by SCST Engineering.

5. The reports listed above are available for review by contacting the Contract Specialist or visiting:

   https://filecloud.sandiego.gov/url/7qq54sb7xp42pa32

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.

2-14.2 Integration of the Work with Separate Contractors. To the "WHITEBOOK", ADD the following:

2. The list of Separate Contractors includes:

   a) City of San Diego's - Department of IT

   b) Public Artist – Roman DeSalvo

   The Mission Trails Field Station project is subject to City Council Policy 900-11, "Inclusion of Public Art in Selected Capital Improvements Program." An artist is under contract with the City to provide public art services for design, fabrication, transport of artwork and oversight during installation of the artwork. The artist is currently developing a design to integrate public art into the project. The resultant artwork will become an acquisition of the Civic Art Collection which is managed by the Commission for Arts and Culture. The general contractor should account for time and materials necessary for coordinating with the artist on the integration of the public artwork throughout the duration of the construction activities for the project. The artwork integration may include, but is not limited to: the installation of potable water lines, drainage systems, electrical and grading. The general contractor should account for this in their overall bid.

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.

3-5.1.7 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.

3-5.1.8 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.

3-5.1.8.1 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 3-5.1.8, "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.

SECTION 4 – CONTROL OF MATERIALS

4-1.3.2 **Inspection by the Agency.** To the "GREENBOOK", DELETE in its entirety and SUBSTITUTE with the following:

1. The City will provide inspection and testing laboratory services within the continental United States within a 200-mile radius of the geographical limits of the City.

4-1.3.3 **Inspection of Items Not Locally Produced.** To the "WHITEBOOK", DELETE in its entirety.

ADD:

4-1.3.3 **Inspection of Items Not Locally Produced.** To the "GREENBOOK", DELETE in its entirety and SUBSTITUTE with the following:

1. When you intend to purchase materials, fabricated products, or equipment from sources located more than 200 miles (321.9 km) outside the geographical limits of the City, City Lab staff or a qualified inspection agency approved by the Engineer, shall be engaged at your expense to inspect the materials, equipment, or process.

2. This approval shall be obtained before producing any material or equipment. City Lab staff or inspector shall evaluate the materials for conformance with the requirements of the Plans and Specifications. You shall forward reports required by the Engineer. No materials or equipment shall be shipped nor shall any processing, fabrication or treatment of such materials be done without proper inspection by City Lab staff or the approved agent. Approval by said agent shall not relieve you of responsibility for complying with the requirements of the Contract Documents.

3. The Engineer may elect City Lab staff to perform inspection of an out-of-town manufacturer. You shall incur additional inspection costs of the Engineer including lodging, meals, and incidental expenses based on Federal Per Diem Rates, along with travel and car rental expenses. If the manufacturing plant operates a double shift, a double shift shall be figured in the inspection costs.

   a) At the option of the Engineer, full time inspection shall continue for the length of the manufacturing period. If the manufacturing period will exceed 3 consecutive weeks, you shall incur additional inspection expenses of the Engineer's supervisor for a trip of 2 Days to the site per month.

   b) When the Engineer elects City Lab staff to perform out-of-town inspections, the wages of staff employed by the City shall not be part of the additional inspection expenses paid by you.

   c) Federal Per Diem Rates can be determined at the location below:

      https://www.gsa.gov/portal/content/104877

4-1.3.4 Inspection Paid For By the Contractor. To the "WHITEBOOK", ADD the following:

1. The special inspections required are listed as follows:

   a) See Construction Drawings.

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

5. 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

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

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

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

1. 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 20, ADD the following:

The **90 Calendar Day** for the Plant Establishment Period is included in the stipulated Contract Time.

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.

ADD:

6-3.2.1.1 Environmental Document.

1. The City of San Diego has prepared a **Revised Final Mitigated Negative Declaration** and **Site Development Permit** for **Mission Trails Field East Fortuna (Mission Trails Regional Park – Multi-Use Staging Area Project)**, **Project No. S-14016,** as referenced in the Contract Appendix. You shall comply with all requirements of the **Revised Final Mitigated Negative Declaration (FMND)** as set forth in **Appendix A**.

2. Compliance with the City's environmental document shall be included in the Contract Price.

3. Contractor will be responsible for supplying and installing sound/visual mitigation measures if the Biological monitor is to determine that construction activities exceed the ambient noise levels permitted under the Revised FMND.

6-3.2.2 Archaeological and Native American Monitoring Program. To the "WHITEBOOK", ADD the following:

4. The Contractor shall retain a qualified archaeologist for this Contract. You shall coordinate your activities and Schedule with the activities and schedules of the archaeologist monitor. Notify the Engineer before noon of the Working Day before monitoring is required. See 2-11, "INSPECTION" for details.

6-8.1.1 Requirements Preparatory to Requesting a Walk-through. To the "WHITEBOOK", ADD the following:

2. You shall notify the Engineer to arrange a final inspection of permanent BMPs installed and shall obtain the completed, signed, and stamped DS-563 Form 30 Days prior to the issuance of the Notice of Completion**.**

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:

General Annual Aggregate Limit	Limits of Liability
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.

7-3.2.5 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.

7-3.5.5 **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.

7-4 **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:

Workers' Compensation	Statutory Employers Liability
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.

7-8.6 **Water Pollution Control.** To the "WHITEBOOK", ADD the following:

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

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 70% 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.

SECTION 9 - MEASUREMENT AND PAYMENT

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

3. The Bid item for "**Construction of Mission Trails Field Station and All Associated Site Work and Improvements**" shall include new construction of a single story administration and community building on an existing vacant lot. Structure to consist of masonry walls, standing seam metal roof, interior partitions, enclosed office space, lobby, reception area, meeting rooms, equipment yard, garage, 3,068sf outdoor covered gathering area, trash enclosure and parking. HVAC, interior / exterior lighting, landscaping, and a fire suppression system to be incorporated as specified in the Plans, Contract Documents, and Technicals.

4. The Bid item for "**Furniture, Fixtures and Equipment**" shall include all items as specified in **Appendix C** of the **Technical Specifications**.

9-3.7 **Compensation Adjustments for Price Index Fluctuations.** To the "WHITEBOOK" ADD the following:

5. This Contract is not subject to the provisions of The "WHITEBOOK" for Compensation Adjustments for Price Index Fluctuations for paving asphalt.

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	

Zone	Zone Limits	Maximum Size (greatest dimension)	Backfill Requirements in Addition to 217-2.1
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).
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 802 – NATIVE HABITAT PROTECTION, INSTALLATION, MAINTENANCE, AND MONITORING

802-2.1 **Project Biologist.** To the "WHITEBOOK", ADD the following:

5. The City will retain a qualified Project Biologist to perform biological monitoring work for this Contract. You shall coordinate your activities and Schedule with the activities and schedules of the Project Biologist.

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)

TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS

City of San Diego

MISSION TRAILS FIELD STATION

East Fortuna

S-14016

December 11, 2017

PREPARED BY:

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TABLE OF CONTENTS

DIVISION 12 – FURNISHINGS

DIVISION 13 – SPECIAL CONSTRUCTION

NOT USED

DIVISION 14 – CONVEYING EQUIPMENT

NOT USED

DIVISION 21 – FIRE SUPRESSION

NOT USED

DIVISION 22 – PLUMBING

DIVISION 23 – HEATING VENTILATING AND AIR CONDITIONING

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Work covered by the Contract Documents.
2. Use of premises.
3. Owner's occupancy requirements.
4. Work Restrictions.
5. Specification formats and conventions.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: Mission Trails Park

1. Project Location: 14450 Equestrian Circle, San Diego, California 92071

B. Owner: City of San Diego

C. Architect: Davy Architecture, 1053 10th Avenue, San Diego, CA 92101

D. The Work consists of the following:
1. Construct a new one story administrative building with associated site work.

E. Project will be constructed under a single prime contract.

F. Title 24 Parts 1-5 and 11 must be kept on site for the duration of construction.

G. All addenda must be signed by the Architect and approved by the City of San Diego.

H. The Project Inspector will be employed by the Owner and approved by the Architect of Record,

I. Comply with the City of San Diego “WHITEBOOK”.

1.3 USE OF PREMISES

A. General: Contractor shall have full use of premises for construction operations, including use of Project site, during construction period. Contractor's use of premises is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

1.4 OWNER'S OCCUPANCY REQUIREMENTS

A. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.

1. Before partial Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of building.
2. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

1.5 WORK RESTRICTIONS

A. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet (8 m) of entrances, operable windows, or outdoor air intakes.

1.6 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 33-division format and CSI/CSC's "MasterFormat" numbering system.

1. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

    a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

C. Arrangement of Drawings: The drawings are arranged by design discipline and not by construction trade. The general contractor is responsible for all of the work on all of the drawings unless specifically noted otherwise.

1. For example conduits not shown on “E” Sheets may be required to complete HVAC or fire alarm work. No adjustment in time or money will be made for such work.

END OF SECTION 011000

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs and video.
2. Periodic construction photographs.

B. Related Requirements:

1. Section 017700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.

2. City of San Diego “WHITEBOOK” for photographic documentation of the progress of the work.

1.2 INFORMATIONAL SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph and video recording. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

1.3 QUALITY ASSURANCE

A. Photographer Qualifications: An individual who is regularly engaged as a professional photographer of construction projects.

1.4 USAGE RIGHTS

A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in JPG format, with minimum size of 8 megapixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. Photographer: Engage a qualified photographer to take construction photographs.

B. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.

C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in file name for each image.

D. Preconstruction Photographs: Before starting construction, take photographs of Project site, staging area and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Construction Manager.

1. Flag excavation areas and construction limits before taking construction photographs.
2. Take 20 photographs to show existing conditions adjacent to property before starting the Work.
3. Take 20 photographs of existing pavements either on or adjacent to areas of work adjoining property to accurately record physical conditions at start of construction.

E. Final Completion Construction Photographs: Take **20** color photographs after date of Substantial Completion for submission as Project Record Documents. Resident Engineerwill inform photographer of desired vantage points.

F. Additional Photographs: Architect oor Resident Engineer may request photographs in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum or in the allowance for construction photographs.

1. Three days' notice will be given, where feasible.
2. In emergency situations, take additional photographs within 24 hours of request.
3. Circumstances that could require additional photographs include, but are not limited to, the following:

a. Special events planned at Project site.
b. Immediate follow-up when on-site events result in construction damage or losses.
c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
d. Substantial Completion of a major phase or component of the Work.
e. Extra record photographs at time of final acceptance.
f. Owner's request for special publicity photographs.

END OF SECTION 013233

SECTION 013300 - SUBMITTAL PROCEDURES

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specifications Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Sections include the following:
   1. Division 1 Section “Project Management and Coordination” for submitting Coordination Drawings.
   2. Division 1 Section “Construction Progress Documentation” for submitting schedules including Contractor’s Construction Schedule and the Submittals Schedule.
   3. Division 1 Section “Closeout Procedures” for submitting warranties Project Record Documentation and operation and maintenance manuals.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect's responsive action.

B. Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

   2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

      a. Resident Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Submittals Schedule: Comply with requirements in Division 01 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.

C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Resident Engineer's receipt of submittal.
   1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time processing must be delayed to permit coordination with subsequent submittals is required. Resident Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
   2. Concurrent Review: Where concurrent review of submittals by Architect's consultants, Owner, or other parties is required, allow 21 days for review of each submittal. The following submittals, at minimum, require concurrent review by Owner:

      a. Hardware
      b. Fire Alarm
      c. Intrusion Alarm
      d. Roofing
      e. Signage
      f. Toilet Accessories
      g. Floor Boxes
      h. Finishes not selected during the design phase
      i. Window Shades
      j. Substitutions

   3. City review: Where submittal must be reviewed by the City, allow 35 days for review of submittal.
   4. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
   5. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.

D. Identification: Place a permanent label or title block on each submittal for identification.

   1. Indicate name of firm or entity that prepared each submittal on label or title block.
   2. Provide a space on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
   3. Include the following information on label for processing and recording action taken:

      a. Project name.
      b. Date.
      c. Name of Contractor.
      d. Name of subcontractor
      e. Name of supplier
      f. Name of manufacturer.
      g. Unique identifier, including revision number
      h. Number and title of appropriate Specification Section
      i. Drawing number and detail references, as appropriate.
      j. Other necessary identification.

E. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.

F. Additional Copies: Unless additional copies are required for final submittal, and unless

Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Resident Engineer will return submittals, without review, received from sources other than Contractor.

1. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.

2. Transmittal Form: Provide locations on form for the following information:
   A. Project name.
   B. Date.
   C. Destination (To:)
   D. Source (Form:)
   E. Names of subcontractor, manufacturer, and supplier.
   F. Category and type of submittal.
   G. Submittal purpose and description.
   H. Submittal and transmittal distribution record.
   I. Sequential submittal number.
   J. Remarks.
   K. Signature of transmitter.

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Use only final submittals with mark indicating action taken by Resident Engineer and Architect in connection with construction.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

   a. Manufacturer's written recommendations.
   b. Manufacturer's product specifications.
   c. Manufacturer's installation instructions.
   d. Standard color charts.

e. Manufacturer's catalog cuts.
f. Wiring diagrams showing factory-installed wiring.
g. Printed performance curves.
h. Operational range diagrams.
i. Mill reports.
j. Standard product operation and maintenance manuals.
k. Compliance with recognized trade association standards.
l. Compliance with recognized testing agency standards.
m. Application of testing agency labels and seals.
n. Notation of coordination requirements.

4. Number of Copies: Submit one PDF copy, unless copies are required for operation and maintenance manuals. Architect will return one PDF copy. Mark up and retain one returned copy as a Project Record Document.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

Dimensions.
b. Identification of products.
c. Fabrication and installation drawings.
d. Roughing-in and setting diagrams.
e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
f. Shopwork manufacturing instructions.
g. Templates and patterns.
h. Schedules.
i. Notation of coordination requirements.
j. Notation of dimensions established by field measurement.
k. Relationship to adjoining construction clearly indicated.
l. Seal and signature of professional engineer if specified.
m. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.

Number of Copies: Submit copies of each submittal, as follows:

A. Submittal: Submit one PDF format copy. Resident Engineer will return the PDF for Contractor to make copies for his subcontractors and his own use.

D. Coordination Drawings: Comply with requirements in Division 1 Section “Project Management and Coordination.”

E. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Samples for initial selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
2. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
3. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect's sample where so indicated. Attach label on unexposed side that includes the following:

    a. Generic description of Sample.
    b. Product name and name of manufacturer.

4. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.

    a. If variation in color, pattern texture, or other characteristic is inherent in the product represented by a Sample, submit at least three sets of units that show approximate limits of the variation.
    b. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

5. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

6. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

    a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

7. Samples for Verification: Submit three sets of samples. Architect will retain two Samples sets; one will be returned.

    a. Submit a single Sample where assembly details, workmanship, fabrication

techniques, connections, operation, and other similar characteristics are to be demonstrated.

F. Submittals Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."

Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name of entity performing subcontract or supplying products.
2. Number and title of related Specification Sections(s) covered by subcontract.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Resident Engineer will not return copies.
2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
3. Test and Inspection Reports: Comply with requirements specified in Division 01 Section "Quality Requirements."

B. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

C. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

D. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

E. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

F. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

I. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

K. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

L. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

M. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."

N. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

O. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.

1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances
5. Required adjustments.
6. Recommendations for cleaning and protection.

P. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1. Statement on condition of substrates and their acceptability for installation of product.
2. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.

Q. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect.

1. Architect will not review submittals that include MSDSs and will return them for resubmittal.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Resident Engineer.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General: Resident Engineer and Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Through the Resident Engineer the Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action .

1. If action is marked Rejected or Revise and Resubmit, this will require the Contractor to resubmit the submittals with reasonable promptness and no fabrication or construction may begin. The Resident Engineer will return to the Contractor; one stamped PDF format copy of shop drawings, and one unmarked copy of brochures, schedules, materials lists and other product data.

C. Informational Submittals: Resident Engineer and Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

E. Resubmittals: If first or subsequent submittal is stamped Rejected or Revised and Resubmit, corrective action shall be taken and resubmitted procedure shall be same as for first submittal. The Contractor shall direct specific attention in writing on resubmitted shop drawing to revision other then the correction requested by the Architect on previous submittals.

F. Distribution Copies: In addition to prints required for his own use, the Contractor shall be responsible for obtaining required prints for, and for distribution to all applicable subcontractors. Make distribution copies from the transparency bearing the Architects stamp.

G. The Architect through the Resident Engineer will check and take action on such drawings and schedules only for conformance with design concept of the Work and compliance with information given in the contract documents. When so directed by the Architect, the Contractor shall make corrections required.

END OF SECTION 013300

SECTION 014000 - 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 stat 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 tet 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 fo 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.

3.4 ASPHALTIC CONCRETE PAVING

A. Asphaltic concrete mix design proposed by the Contractor shall be submitted to the Resident Engineer for review, Proposed mix may be tested for conformance with the specifications, including grading, asphalt content and stability.

B. At the Resident Engineer's option, one sample of the mix shall be taken during each day's paving operation and tested for asphalt content and gradation.

C. At the Resident Engineer's option, continuous inspection of the paving operation shall be provided. Testing Laboratory shall check for proper thickness, proper mix temperatures, proper rolling procedures and general workmanship.

3.5 Perform additional tests that may be required by individual Specification Sections.

3.6 Perform structural tests and inspections in accordance with the current CBC.

END OF SECTION 014000

SECTION 014100 - TESTING LABORATORY SERVICES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 REFERENCE

1.1.1 Title 24, CCR.

1.1.2 ASTM D 3740 - Practice for Evaluation of Agencies in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

1.1.3 ASTM E 329 - Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction.

1.3 SELECTION AND PAYMENT

1.3.1 Contractor shall employ and pay for services of an independent testing laboratory to perform inspection and testing as specified in this Section.

1.3.2 Unless specified as the Owner's responsibility, all other testing, mix design preparation and related quality control and certification requirements shall be paid by the Contractor.

1.3.3 All concrete mix designs shall be prepared at Contractor's cost and in compliance with Section 03300.0.

1.3.4 All asphalt concrete mix designs shall be prepared at Contractor's cost and in compliance with Section 321216.

1.4 QUALITY ASSURANCE

1.4.1 Laboratory: Authorized to operate in state in which project is located and currently approved by the City of San Diego.

1.4.2 Laboratory Staff: Maintain a full-time registered engineer on staff to review services.

1.4.3 Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards (NBS) standards or accepted values of natural physical constants.

1.4.4 Welding inspectors shall be certified in accordance with AWS QC1 standard for Certified Welding Inspectors (CWI).

1.5 LABORATORY RESPONSIBILITIES

1.5.1 Perform specified inspection, sampling, and testing of products in accordance with specified standards.

1.5.2 Ascertain compliance of materials and mixes with requirements of Contract Documents.

1.5.3 Promptly notify Resident Engineer of observed irregularities or nonconformance of work or products.

1.5.4 Perform special inspections for areas of work as shown on drawings and specified in respective sections of the specifications in compliance with Section 4-333, Part 1, Title 24, CCR.

1.4.5 Perform additional inspections and tests required by Resident Engineer.

1.5 LABORATORY REPORTS

1.5.1. After each inspection and test, promptly submit copies of laboratory report to Resident Engineer, Architect, Structural Engineer, Contractor, Project Engineer, and other parties as required by referenced sections and applicable regulations.

1.5.2. Include:

1.5.2.2. Date issued.

1.5.2.3. Project title, City project number and permit number.

1.5.2.4 Name of inspector.

1.5.2.5. Date and time of sampling or inspection.

1.5.2.6. Method of obtaining sample.

1.5.2.7. Identification of product and Specifications section.

1.5.2.8. Location in the Project.

1.5.2.9. Type of inspection or test.

1.5.2.10 Date of test.

1.5.2.11. Results of tests.

1.5.2.12 Conformance with Contract Documents.

1.5.2.13. Indicate samples taken but not tested.

1.5.3. Testing agency shall provide a verified report in compliance with Chapter 4, Part 1, Section 4-336, of Title 24, CCR.

1.5.3.1. Provide such reports in duplicate, on approved form.

1.5.3.2. Provide reports each time work on the project is suspended, on February 1, May 1, August 1, and November 1; and at completion of project.

1.5.3.3. Reports shall document actions taken, tests made, and other aspects of the construction operations for the period prescribed.

1.5.4. In addition, Testing Agency shall provide semi-monthly reports as required by Section 4-337, Part 1, Title 24, CCR.

1.6 LIMITS ON TESTING LABORATORY AUTHORITY

1.6.1 Laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

1.6.2 Laboratory may not approve or accept any portion of the work.

1.6.3 Laboratory may not assume any duties of Contractor.

1.6.4 Laboratory has no authority to stop the work.

1.7 CONTRACTOR RESPONSIBILITIES

1.7.1 Deliver or make available to laboratory at designated location adequate samples of materials proposed to be used which require testing, along with proposed mix designs.

Cooperate with laboratory personnel and provide access to the work and to manufacturer's facilities.

Provide incidental labor and facilities to provide access to work to be tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, storage and curing of test samples.

Notify Resident Engineer and laboratory two working days prior to expected time for operations requiring inspection and testing services.

1.8 SCHEDULE OF INSPECTIONS AND TESTS BY OWNER'S TESTING AGENCY

1.8.1 SITE EXCAVATION, FILLS AND FOUNDATION PREPARATION (TITLE 24, PART 2)

1.8.1.1. All earthwork, including earth fill compaction – 1804A and Appendix J

1.8.1.2. Inspection of Excavation/fill Installation – 1705A.6

1.8.2. Concrete (Title 24, Part 2, Chapter 19A)

1.8.2.1. Materials

1.8.2.1.1. Portland Cement Tests - 1903A.4

1.8.2.1.2. Concrete Aggregates - 1903A.6

1.8.2.1.3. Reinforcing Bars - 1903A.1

1.8.2.1.4. Batch Plant Inspection -

1.8.2.1.5. Waiver of Batch Plant Inspection and Tests – 1705A.4.3

1.8.2.1.6. Admixtures– 1903A

1.8.2.2. Concrete Quality

1.8.2.2.1. Proportions of Concrete – ACI

1.8.2.2.2. Strength Tests for Concrete – 1705A.3 and ACI

1.8.2.3. Concrete Inspection

1.8.2.3.1. Job Site Inspection

1.8.2.3.2. Batch Plant or Weighmaster Inspection – 1705A3.2

Structural Steel Inspection

a. Shop Fabrication Inspection – 1704A.2.5
b. High Strength Bolt Inspection – 17045A.2
c. Welding inspection – 1705A.2.2
d. Nelson Stud Welding – 1705A2.2, 2213A.2

END OF SECTION 014100

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

D. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the organizations responsible for the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG Americans with Disabilities Act (ADA)
Architectural Barriers Act (ABA)

CFR Code of Federal Regulations

DOD Department of Defense Military Specifications and Standards

DSCC Defense Supply Center Columbus (See FS)

FED-STD Federal Standard (See FS)

FS Federal Specification

FTMS Federal Test Method Standard (See FS)

MIL (See MILSPEC)

MIL-STD (See MILSPEC)

MILSPEC Military Specification and Standards

UFAS Uniform Federal Accessibility Standards

1.3 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA Aluminum Association, Inc. (The)

AAADM	American Association of Automatic Door Manufacturers
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists (The)
ABAA	Air Barrier Association of America
ABMA	American Bearing Manufacturers Association
ACI	ACI International (American Concrete Institute)
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies, Inc. (The)
AF&PA	American Forest & Paper Association
AGA	American Gas Association
AGC	Associated General Contractors of America (The)
AHA	American Hardboard Association (Now part of CPA)
AHAM	Association of Home Appliance Manufacturers
AI	Asphalt Institute
AIA	American Institute of Architects (The)
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALCA	Associated Landscape Contractors of America (Now PLANET - Professional Landcare Network)
ALSC	American Lumber Standard Committee, Incorporated
AMCA	Air Movement and Control Association International, Inc.
ANSI	American National Standards Institute
AOSA	Association of Official Seed Analysts, Inc.

APA	APA - The Engineered Wood Association
APA	Architectural Precast Association
API	American Petroleum Institute
ARI	Air-Conditioning & Refrigeration Institute
ARMA	Asphalt Roofing Manufacturers Association
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	ASME International
ASSE	American Society of Sanitary Engineering
ASTM	ASTM International (American Society for Testing and Materials International)
AWCI	AWCI International (Association of the Wall and Ceiling Industry International)
AWCMA	American Window Covering Manufacturers Association (Now WCSC)
AWI	Architectural Woodwork Institute
AWPA	American Wood-Preservers' Association
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association (The)
BICSI	BICSI
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International)
BISSC	Baking Industry Sanitation Standards Committee
CCC	Carpet Cushion Council
CDA	Copper Development Association
CEA	Canadian Electricity Association

CFFA	Chemical Fabrics & Film Association, Inc.
CGA	Compressed Gas Association
CIMA	Cellulose Insulation Manufacturers Association
CISCA	Ceilings & Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CPA	Composite Panel Association
CPPA	Corrugated Polyethylene Pipe Association
CRI	Carpet & Rug Institute (The)
CRSI	Concrete Reinforcing Steel Institute
CSA	CSA International (Formerly: IAS - International Approval Services)
CSI	Cast Stone Institute
CSI	Construction Specifications Institute (The)
CSSB	Cedar Shake & Shingle Bureau
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute)
DHI	Door and Hardware Institute
EIA	Electronic Industries Alliance
EIMA	EIFS Industry Members Association
EJCDC	Engineers Joint Contract Documents Committee
EJMA	Expansion Joint Manufacturers Association, Inc.
ESD	ESD Association
FIBA	Federation Internationale de Basketball Amateur (The International Basketball Federation)
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation)
FMG	FM Global (Formerly: FM - Factory Mutual System)
FMRC	Factory Mutual Research (Now FMG)

FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.
FSA	Fluid Sealing Association
FSC	Forest Stewardship Council
GA	Gypsum Association
GANA	Glass Association of North America
GRI	(Now GSI)
GS	Green Seal
GSI	Geosynthetic Institute
HI	Hydraulic Institute
HI	Hydronics Institute
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)
HPVA	Hardwood Plywood & Veneer Association
HPW	H. P. White Laboratory, Inc.
IAS	International Approval Services (Now CSA International)
IBF	International Badminton Federation
ICEA	Insulated Cable Engineers Association, Inc.
ICRI	International Concrete Repair Institute, Inc.
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The)
IESNA	Illuminating Engineering Society of North America
IEST	Institute of Environmental Sciences and Technology
IGCC	Insulating Glass Certification Council
IGMA	Insulating Glass Manufacturers Alliance
ILI	Indiana Limestone Institute of America, Inc.
ISO	International Organization for Standardization

ISSFA	International Solid Surface Fabricators Association
ITS	Intertek
ITU	International Telecommunication Union
KCMA	Kitchen Cabinet Manufacturers Association
LMA	Laminating Materials Association (Now part of CPA)
LPI	Lightning Protection Institute
MBMA	Metal Building Manufacturers Association
MFMA	Maple Flooring Manufacturers Association, Inc.
MFMA	Metal Framing Manufacturers Association
MH	Material Handling (Now MHIA)
MHIA	Material Handling Industry of America
MIA	Marble Institute of America
MPI	Master Painters Institute
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc.
NAAMM	National Association of Architectural Metal Manufacturers
NACE	NACE International (National Association of Corrosion Engineers International)
NADCA	National Air Duct Cleaners Association
NAGWS	National Association for Girls and Women in Sport
NAIMA	North American Insulation Manufacturers Association
NBGQA	National Building Granite Quarries Association, Inc.
NCAA	National Collegiate Athletic Association (The)
NCMA	National Concrete Masonry Association
NCPI	National Clay Pipe Institute
NCTA	National Cable & Telecommunications Association
NEBB	National Environmental Balancing Bureau

NECA	National Electrical Contractors Association
NeLMA	Northeastern Lumber Manufacturers' Association
NEMA	National Electrical Manufacturers Association
NETA	InterNational Electrical Testing Association
NFHS	National Federation of State High School Associations
NFPA	NFPA (National Fire Protection Association)
NFRC	National Fenestration Rating Council
NGA	National Glass Association
NHLA	National Hardwood Lumber Association
NLGA	National Lumber Grades Authority
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association)
NRCA	National Roofing Contractors Association
NRMCA	National Ready Mixed Concrete Association
NSF	NSF International (National Sanitation Foundation International)
NSSGA	National Stone, Sand & Gravel Association
NTMA	National Terrazzo & Mosaic Association, Inc. (The)
NTRMA	National Tile Roofing Manufacturers Association (Now TRI)
NWWDA	National Wood Window and Door Association (Now WDMA)
OPL	Omega Point Laboratories, Inc. (Acquired by ITS - Intertek)
PCI	Precast/Prestressed Concrete Institute
PDCA	Painting & Decorating Contractors of America
PDI	Plumbing & Drainage Institute
PGI	PVC Geomembrane Institute
PLANET	Professional Landcare Network (Formerly: ACLA - Associated Landscape Contractors of America)
PTI	Post-Tensioning Institute

RCSC	Research Council on Structural Connections
RFCI	Resilient Floor Covering Institute
RIS	Redwood Inspection Service
RTI	(Formerly: NTRMA - National Tile Roofing Manufacturers Association) (Now TRI)
SAE	SAE International
SDI	Steel Deck Institute
SDI	Steel Door Institute
SEFA	Scientific Equipment and Furniture Association
SGCC	Safety Glazing Certification Council
SIA	Security Industry Association
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)
SJI	Steel Joist Institute
SMA	Screen Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SMPTE	Society of Motion Picture and Television Engineers
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division)
SPIB	Southern Pine Inspection Bureau (The)
SPRI	Single Ply Roofing Industry
SSINA	Specialty Steel Industry of North America
SSPC	SSPC: The Society for Protective Coatings
STI	Steel Tank Institute
SWI	Steel Window Institute
SWRI	Sealant, Waterproofing, & Restoration Institute
TCA	Tile Council of America, Inc.

TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance
TMS	The Masonry Society
TPI	Truss Plate Institute, Inc.
TPI	Turfgrass Producers International
TRI	Tile Roofing Institute (Formerly: RTI - Roof Tile Institute)
UL	Underwriters Laboratories Inc.
UNI	Uni-Bell PVC Pipe Association
USAV	USA Volleyball
USGBC	U.S. Green Building Council
USITT	United States Institute for Theatre Technology, Inc.
WASTEC	Waste Equipment Technology Association
WCLIB	West Coast Lumber Inspection Bureau
WCMA	Window Covering Manufacturers Association (Now WCSC)
WCSC	Window Covering Safety Council (Formerly: WCMA - Window Covering Manufacturers Association)
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association)
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California)
WIC	Woodwork Institute of California (Now WI)
WMMPA	Wood Moulding & Millwork Producers Association
WSRCA	Western States Roofing Contractors Association
WWPA	Western Wood Products Association

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

BOCA	BOCA International, Inc. (See ICC)
IAPMO	International Association of Plumbing and Mechanical Officials

ICBO International Conference of Building Officials (See ICC)

ICBO ES ICBO Evaluation Service, Inc. (See ICC-ES)

ICC International Code Council

ICC-ES ICC Evaluation Service, Inc.

SBCCI Southern Building Code Congress International, Inc. (See ICC)

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CE Army Corps of Engineers

CPSC Consumer Product Safety Commission

DOC Department of Commerce

DOD Department of Defense

DOE Department of Energy

EPA Environmental Protection Agency

FAA Federal Aviation Administration

FCC Federal Communications Commission

FDA Food and Drug Administration

GSA General Services Administration

HUD Department of Housing and Urban Development

LBL Lawrence Berkeley National Laboratory

NCHRP National Cooperative Highway Research Program (See TRB)

NIST National Institute of Standards and Technology

OSHA Occupational Safety & Health Administration

PBS Public Building Service (See GSA)

PHS Office of Public Health and Science

RUS Rural Utilities Service (See USDA)

SD State Department

TRB Transportation Research Board

USDA Department of Agriculture

USPS Postal Service

E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CBHF State of California, Department of Consumer Affairs
Bureau of Home Furnishings and Thermal Insulation

CPUC California Public Utilities Commission

TFS Texas Forest Service
Forest Resource Development

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

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 requirements for temporary utilities, support facilities, and security and protection facilities.

B. See Division 01 Section "Execution Requirements" for progress cleaning requirements.

C. See Divisions 02 through 32 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.

1.3 DEFINITIONS

A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.4 USE CHARGES

A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

B. Water Service: The Contactor shall provide and obtain its own construction water meter through the Padre Dam Water Authority. The contractor shall be responsible for all fees and charges. Provide connections and extensions of services as required for construction operations.

C. Electric Power Service: Electric power from Owner's existing system is not available for use. The contractor shall be responsible for all fees and charges for electricity. Provide connections and extensions of services as required for construction operations.

1.5 SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel. Regulatory compliance CBC Chap. 33 CFC Chapter 14.

1.6 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.7 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pavement: Comply with Division 32 Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.76-mm-) thick, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top rails or galvanized barbed-wire top strand.

C. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide galvanized steel bases for supporting posts.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

C. See “WHITEBOOK” for additional requirements.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; 2a: 40B: C minimum CFC 906 during construction with class and extinguishing agent as required by locations and classes of fire exposures.

HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-

contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service. Water supply for fire per CFC 501.4 , 1412.1 protection shall be installed prior to combustibles arriving on site.

1. Arrange with utility company, Resident Engineer and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to

produce ambient condition required and minimize energy consumption.

G. Electric Power Service: Use of Owner's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Owner.

H. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead, unless otherwise indicated.

Connect temporary service to Owner's existing power source, as directed by Owner.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

J. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line for each field office.

1. Provide additional telephone lines for the following:

a. Provide a dedicated telephone line for each facsimile machine and computer in each field office.

2. At each telephone, post a list of important telephone numbers including police and fire departments, Contractor's home office, Architect's office, Owner's office, Principal subcontractors' field and home offices.

3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

K. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail in field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following: Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines. Comply with CBC Chapter 33 : CFC Chapter 14 NFPA 241.
2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Maintain existing roads and paved areas adequate for construction operations. Approved fire access routes compliant with CFC 503.2-503.2.7 to be approved and maintained per CFC 503.1410.1

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment

as required to minimize dust.D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.

G. Project Identification and Temporary Signs: Provide Project identification and other signs as required. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.

1. Provide temporary, directional signs for construction personnel and visitors.
2. Maintain and touchup signs so they are legible at all times.

H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 01 Section "Execution Requirements" for progress cleaning requirements.

I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

C. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.

F. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.

Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys.

G. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with CFC Chapter 14 NFPA 241.

1. Prohibit smoking in construction areas.
2. Welding compliant with CFC Chapter 26 Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and

protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

B. See Division 01 Section "Closeout Procedures" for submitting warranties for Contract closeout.

C. See Divisions 02 through 49 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.2 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.3 SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use form provided by Owner.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

    a. Statement indicating why specified material or product cannot be provided.
    b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
    c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
    d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    e. Samples, where applicable or requested.
    f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
    g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
    h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
    i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
    j. Cost information, including a proposal of change, if any, in the Contract Sum.
    k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
    l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Resident Engineer's: If necessary, Resident Engineer will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within **15** days of receipt of request, or **7** days of receipt of additional information or documentation, whichever is later.

    a. Form of Acceptance: Change Order.
    b. Use product specified if Resident Engineer cannot make a decision on use of a proposed substitution within time allocated.

B. Comparable Product Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Resident Engineer's: If necessary, Resident Engineer will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable

product request within **15** days of receipt of request, or **7** days of receipt of additional information or documentation, whichever is later.

a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
b. Use product specified if Architect cannot make a decision on use of a comparable product request within time allocated.

C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store cementitious products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

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

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
5. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
6. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
7. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
8. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

    a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.

10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.

    a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
    b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

A. Timing: Architect will consider requests for substitution if received within **60** days after **the Notice to Proceed.** Requests received after that time may be considered or rejected at discretion of Architect.

B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
2. Requested substitution does not require extensive revisions to the Contract Documents.
3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.

2.3 COMPARABLE PRODUCTS

A. Conditions: Resident Engineer will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Resident Engineer will return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017000 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 EXECUTION REQUIREMENTS

A. Certificates: Submit certificate signed by land surveyor or professional engineer certifying that location and elevation of improvements comply with requirements.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

1.2 CLOSEOUT SUBMITTALS

A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

B. Certified List of Incomplete Items: Final submittal at Final Completion.

C. Operation and Maintenance Data: Submit one bound copy and one electronic copy of manual in PDF format.

D. PDF Electronic File: Assemble manual into a composite electronically indexed file. Submit on digital media.

E. Record Drawings: Submit one set of marked-up record prints.

F. Record Digital Data Files: Submit data file and one set of plots.

G. Record Product Data: Submit one paper copy and one annotated PDF electronic files and directories of each submittal.

1.3 SUBSTANTIAL COMPLETION PROCEDURES

A. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.

B. Submittals Prior to Substantial Completion: Before requesting Substantial Completion inspection, complete the following:

1. Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other sections, including project record documents, operation and maintenance manuals, property surveys, similar final record information, warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

3. Submit maintenance material submittals specified in other sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect.
4. Submit test/adjust/balance records.
5. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Before requesting Substantial Completion inspection, complete the following:

1. Advise Resident Engineer of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Advise Owner of changeover in heat and other utilities.
6. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
7. Remove temporary facilities and controls.
8. Complete final cleaning requirements, including touchup painting.
9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Resident Engineer will proceed with inspection or advise Contractor of unfulfilled requirements. Resident Engineer will prepare the Certificate of Substantial Completion after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.

1.4 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting inspection for determining final completion, complete the following:

1. Submit a final Application for Payment.
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare final Certificate for Payment after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

PART 2 - PRODUCTS

2.1 MATERIALS

A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

B. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

2.2 OPERATION AND MAINTENANCE DOCUMENTATION

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.

B. Organization: Unless otherwise indicated, organize manual into separate sections for each system and subsystem, and separate sections for each piece of equipment not part of a system.

C. Organize data into three-ring binders with identification on front and spine of each binder, and envelopes for folded drawings. Include the following:

1. Manufacturer's operation and maintenance documentation.
2. Maintenance and service schedules.
3. Maintenance service contracts. Include name and telephone number of service agent.
4. Emergency instructions.
5. Spare parts list and local sources of maintenance materials.
6. Wiring diagrams.
7. Copies of warranties. Include procedures to follow and required notifications for warranty claims

2.3 RECORD DRAWINGS

A. Record Prints: Maintain a set of prints of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued. Mark to show actual installation where installation varies from that shown originally. Accurately record information in an acceptable drawing technique.

1. Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings.

1. Format: Annotated PDF electronic file.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, and other construction affecting the Work.

B. Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Verify compatibility with and suitability of substrates.
2. Examine roughing-in for mechanical and electrical systems.
3. Examine walls, floors, and roofs for suitable conditions.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Take field measurements as required to fit the Work properly. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication.

E. Verify space requirements and dimensions of items shown diagrammatically on Drawings.

F. Surface and Substrate Preparation: Comply with manufacturer's written recommendations for preparation of substrates to receive subsequent work.

3.2 CONSTRUCTION LAYOUT AND FIELD ENGINEERING

A. Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks.

B. The Owner will engage a land surveyor or professional engineer to lay two or more layout monuments for the contractor’s use. Contractor to lay out the Work using these monuments and accepted surveying practices. Contractor shall protect and maintain the monuments through out the work

C. Engage a land surveyor or professional engineer to prepare a final property survey showing significant features (real property) for Project.

1. At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.3 INSTALLATION

A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
3. Maintain minimum headroom clearance of 96 inches (2440 mm) in occupied spaces and in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations.

C. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

D. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed.

E. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.

F. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

G. Use products, cleaners, and installation materials that are not considered hazardous.

3.4 CLEANING

A. Clean Project site and work areas daily, including common areas. Dispose of materials lawfully.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
3. Remove debris from concealed spaces before enclosing the space.

B. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion:

1. Clean Project site, yard, and grounds, in areas disturbed by construction activities. Sweep paved areas; remove stains, spills, and foreign deposits. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

2. Sweep paved areas broom clean. Remove spills, stains, and other foreign deposits.
3. Remove labels that are not permanent.
4. Clean transparent materials, including mirrors. Remove excess glazing compounds.
5. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. Sweep concrete floors broom clean.
6. Vacuum carpeted surfaces and wax resilient flooring.
7. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and foreign substances. Clean plumbing fixtures. Clean light fixtures, lamps, globes, and reflectors.
8. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

3.5 OPERATION AND MAINTENANCE MANUAL PREPARATION

A. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

B. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are unavailable and where the information is necessary for proper operation and maintenance of equipment or systems.

C. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams.

3.6 DEMONSTRATION AND TRAINING

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system. Include a detailed review of the following:

1. Include instruction for basis of system design and operational requirements, review of documentation, emergency procedures, operations, adjustments, troubleshooting, maintenance, and repairs.

END OF SECTION 017000

SECTION 017300 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. General installation of products.
4. Progress cleaning.
5. Starting and adjusting.
6. Protection of installed construction.
7. Correction of the Work.

B. See Division 1 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.2 SUBMITTALS

A. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

C. Certified Surveys: Submit two copies signed by land surveyor.

D. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.3 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and points of connection of utility services.

B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before

fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
3. Inform installers of lines and levels to which they must comply.
4. Check the location, level and plumb, of every major element as the Work progresses.
5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Reference Points: The City will locate two permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Documents.

B. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

C. Final Property Survey: Prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

1. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.9 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017329 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specifications Sections, apply to this section.

1.2 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

1.3 DEFINITIONS

A. Cutting: Removal of existing construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore surface to original conditions after installation of other work.

1.4 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:

1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
2. Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes to other significant elements.
3. Products: List products to be used and firms or entities that will perform the work.
4. Dates: indicate when cutting and patching will be performed.
5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
6. Proposal shall include Contractors stamp or certification, Contractor’s name, project Architects name, project location and name, and Contractor’s signature acknowledging review of submittal.
7. Resident Engineer’s Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waiver right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

A. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

B. Visual Requirements: Do not cut or patch construction in a manner that results in visual evidence of cutting and patching. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections of these Specifications.

B. Materials: Use materials identical to existing materials. For exposed surfaces, use material that visually match existing adjacent surfaces to the fullest extent possible.

1. See Appendix for existing conditions materials' installed, including concrete mix designs and paving submittals. Contractor is responsible for matching existing conditions at the west fire lane where Contractor is required to replace in-kind any demolished paving during construction demolition.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B Protection: Protect existing construction during cutting and patching to prevent damage.

C. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to minimize interruption of services to occupied areas.

1.1 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
4. Ceilings: Patch, repair, or re-hang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather tight condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 017329

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for the following:

1. Recycling nonhazardous demolition and construction waste.
2. Disposing of nonhazardous demolition and construction waste.

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

1.3 PERFORMANCE REQUIREMENTS

A. General: Develop waste management plan that results in end-of-Project rates for recycling of 75 percent by weight of total waste generated by the Work.

1.4 SUBMITTALS

A. Waste Management Plan: Submit 3 copies of plan within 7 days of date established for commencement of the Work.

B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit three copies of report. Include separate reports for demolition and construction waste. Include the following information:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in tons (tonnes).
4. Quantity of waste salvaged, both estimated and actual in tons (tonnes).
5. Quantity of waste recycled, both estimated and actual in tons (tonnes).

6. Total quantity of waste recovered (salvaged plus recycled) in tons (tonnes).
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

C. Waste Reduction Calculations: Before request for Substantial Completion, submit three copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

D. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

E. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

F. Qualification Data: For Waste Management Coordinator and refrigerant recovery technician.

G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.5 QUALITY ASSURANCE

A. Waste Management Conference: Conduct conference at Project site.

1.6 WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification and waste reduction work plan. Include separate sections in plan for demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
3. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement waste management plan as approved by Architect. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Division 01 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Owner.

C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING DEMOLITION WASTE

A. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility.

B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

1. Pulverize concrete to maximum 4-inch (100-mm) size.

C. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

D. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.
2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

E. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

F. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.

1. Separate suspension system, trim, and other metals from panels and tile and sort with other metals.

G. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.

1. Store clean, dry carpet and pad in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

H. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.

I. Plumbing Fixtures: Separate by type and size.

J. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

K. Lighting Fixtures: Separate lamps by type and protect from breakage.

L. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

M. Conduit: Reduce conduit to straight lengths and store by type and size.

3.4 RECYCLING CONSTRUCTION WASTE

A. Packaging:

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

B. Site-Clearing Wastes: Chip brush, branches, and trees on-site.

C. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

D. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.5 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 017419

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Emergency manuals.
2. Operation manuals for systems, subsystems, and equipment.
3. Maintenance manuals for the care and maintenance of products, materials, and finishes, systems and equipment.

B. See Divisions 02 through 32 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.2 SUBMITTALS

A. Manual: Submit one copy of each manual in final form at least 15 days before final inspection. Resident Engineer will return copy with comments within 15 days after final inspection.

1. Correct or modify each manual to comply with Resident Engineer’s comments. Submit 3 copies of each corrected manual within 15 days of receipt of Architect's comments.

PART 2 - PRODUCTS

2.1 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain a title page, table of contents, and manual contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name, address, and telephone number of Contractor.
6. Name and address of Architect.
7. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

    a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for type of emergency, emergency instructions, and emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component for fire, flood, gas leak, water leak, power failure, water outage, equipment failure and chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include instructions on stopping, shutdown instructions for each type of emergency, operating instructions for conditions outside normal operating limits, and required sequences for electric or electronic systems.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and equipment descriptions, operating standards, operating procedures, operating logs, wiring and control diagrams, and license requirements.

B. Descriptions: Include the following:

1. Product name and model number.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include start-up, break-in, and control procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; and required sequences for electric or electronic systems.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and inspection procedures, types of cleaning agents, methods of cleaning, schedule for cleaning and maintenance, and repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including maintenance instructions, drawings and diagrams for maintenance, nomenclature of parts and components, and recommended spare parts for each component part or piece of equipment:

D. Maintenance Procedures: Include test and inspection instructions, troubleshooting guide, disassembly instructions, and adjusting instructions, and demonstration and training videotape if available, that detail essential maintenance procedures:

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.

1. Do not use original Project Record Documents as part of operation and maintenance manuals.

F. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. See Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.

C. See all Divisions Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.2 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set of marked-up Record Prints.
2. Number of Copies: Submit copies of Record Drawings as follows:

a. Initial Submittal: Submit one set of plots from corrected Record CAD Drawings and one set of marked-up Record Prints. Architect will initial and date each plot and mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Architect will return plot and prints for organizing into sets, printing, binding, and final submittal.
b. Final Submittal: Submit one set of marked-up Record Prints, and the following:

1) Record Transparencies: One set.
2) Record CAD Drawing Files and Plots: One set.
3) Copies printed from Record CAD Drawing Plots: Three. Plot and print each Drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one copy of each Product Data submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record CAD Drawings: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Architect. When authorized, prepare a full set of corrected CAD Drawings of the Contract Drawings, as follows:

1. Format: Same CAD program, version, and operating system as the original Contract Drawings.
2. Incorporate changes and additional information previously marked on Record Prints. Delete, redraw, and add details and notations where applicable.
3. Refer instances of uncertainty to Architect for resolution.
4. Architect will furnish Contractor one set of CAD Drawings of the Contract Drawings for use in recording information.

    a. Architect makes no representations as to the accuracy or completeness of CAD Drawings as they relate to the Contract Drawings.
    b. CAD Software Program: The Contract Drawings are available in AutoCAD.

C. Format: Identify and date each Record Drawing; include the designation "**PROJECT RECORD DRAWING**" in a prominent location.

1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Record Transparencies: Organize into unbound sets matching Record Prints. Place transparencies in durable tube-type drawing containers with end caps. Mark end cap of

each container with identification. If container does not include a complete set, identify Drawings included.

3. Record CAD Drawings: Organize CAD information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each CAD file.
4. Identification: As follows:

    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Architect.
    e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. Note related Change Orders and Record Drawings where applicable.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Demonstration and training videotapes.

B. See Divisions 02 through 33 Sections for specific requirements for demonstration and training for products in those Sections.

1.2 SUBMITTALS

A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

B. Demonstration and Training Videotapes: Submit two copies within seven days of end of each training module.

1.3 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Preinstruction Conference: Conduct conference at Project site. Review methods and procedures related to demonstration and training.

D. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Resident Engineer.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:

1. Basis of System Design, Operational Requirements, and Criteria: Include system and equipment descriptions, operating standards, regulatory requirements, equipment function, operating characteristics, limiting conditions, and performance curves.
2. Documentation: Review emergency, operations, and maintenance manuals; Project Record Documents; identification systems; warranties and bonds; and maintenance service agreements.
3. Emergencies: Include instructions on stopping; shutdown instructions; operating instructions for conditions outside normal operating limits; instructions on meaning of warnings, trouble indications, and error messages; and required sequences for electric or electronic systems.
4. Operations: Include startup, break-in, control, and safety procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; operating procedures for emergencies and equipment failure; and required sequences for electric or electronic systems.
5. Adjustments: Include alignments and checking, noise, vibration, economy, and efficiency adjustments.
6. Troubleshooting: Include diagnostic instructions and test and inspection procedures.
7. Maintenance: Include inspection procedures, types of cleaning agents, methods of cleaning, procedures for preventive and routine maintenance, and instruction on use of special tools.
8. Repairs: Include diagnosis, repair, and disassembly instructions; instructions for identifying parts; and review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Owner will furnish an instructor to describe Owner's operational philosophy.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner with at least seven days' advance notice.

D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

3.2 DEMONSTRATION AND TRAINING VIDEOTAPES

A. General: Engage a qualified commercial photographer to record demonstration and training videotapes. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Videotape Format: Provide high-quality VHS color videotape in full-size cassettes.

C. Narration: Describe scenes on videotape by audio narration by microphone while videotape is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.

END OF SECTION 017900

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

B. See Division 31 Section "Earth Moving" for drainage fill under slabs-on-grade.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture.

C. Shop Drawings: For steel reinforcement and formwork. Material test reports and certificates.

D. Mock-ups for all exposed concrete finishes.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5. Sections 1 through 5 and Section 7, "Lightweight Concrete."
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

C. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 STEEL REINFORCEMENT

A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 60 percent.

B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type II. Supplement with the following:

a. Fly Ash: ASTM C 618, Class F.
b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33, graded, nominal maximum coarse-aggregate size.

1. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Lightweight Aggregate: ASTM C 330, maximum aggregate size.

D. Water: ASTM C 94/C 94M and potable.

E. Air-Entraining Admixture: ASTM C 260.

F. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.

2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.4 VAPOR RETARDERS

A. Plastic Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

B. Plastic Vapor Retarder: ASTM E 1745, Class B. Include manufacturer's recommended adhesive or pressure-sensitive tape.

C. Plastic Vapor Retarder: ASTM E 1745, Class C, or polyethylene sheet, ASTM D 4397, not less than 10 mils (0.25 mm) thick. Include manufacturer's recommended adhesive or pressure-sensitive joint tape.

2.5 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

G. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

H. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.6 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

2.7 CONCRETE MIXTURES

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

C. Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3250 psi at 28 days, 4000 psi for vehicular traffic surfaces.
2. Maximum Water-Cementitious Materials Ratio: 0.50.
3. Slump Limit: 4 inches (100 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
4. Air Content: 5-1/2 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.
5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for nominal maximum aggregate size.
6. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.

2.8 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg. F (30 and 32 deg. C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg. F (32 deg. C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork according to ACI 301 to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Chamfer exterior corners and edges of permanently exposed concrete as indicated on drawings.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR RETARDERS

A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-third of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

C. Cold-Weather Placement: Comply with ACI 306.1.

D. Hot-Weather Placement: Comply with ACI 301.

3.7 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces as indicated on construction documents.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces as indicated on construction documents.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform

color and texture. Do not apply cement grout other than that created by the rubbing process.

2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part Portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white Portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in 1 direction.

1. Apply scratch finish to surfaces as indicated on construction documents.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces as indicated on construction documents.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces as indicated on construction documents.
2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot- (3.05-m-) long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/8 inch (3.2 mm).

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

3.9 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

    a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.10 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Grind and overlay is not acceptable.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Contractor shall engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

1. Testing Services: Tests shall be performed according to ACI 301.

END OF SECTION 033000

SECTION 03 33 00

LANDSCAPE ARCHITECTURAL CONCRETE

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 specifies cast-in-place Landscape Architectural concrete including form facings, reinforcement accessories, concrete materials, concrete mixture design, placement procedures, and finishes for cast in place concrete curbs, headers, walls, stairs, benches, site furnishings, footings and miscellaneous site concrete work.

B. Related Sections include the following:

1. Division 3 Section "Cast-In-Place Concrete" for formwork; material, fabrication, and installation requirements for steel reinforcement; and field quality control.
2. Division 2 Section "Concrete Paving" for coordination with adjacent curbs, gutters, driveways, roadways, and walkways
3. Division 2 Section "Concrete Paving Joint Sealants" for joint sealants in contraction and other joints in cast-in-place Landscape Architectural concrete.
4. Division 2 Section "Decorative Concrete Paving" for Landscape Architectural concrete pavement and flatwork finishes.
5. Division 2 Section “Plants” and “Turf and Grasses” for coordination with adjacent planting areas.
6. Division 2 Section “Asphalt Paving” for coordination with adjacent asphalt paving areas.
7. Division 2 Section “Site Furnishings” for footing requirements for site furnishings
8. Division 2 Section “Unit Paving” for concrete sub-base requirements for brick pavers and truncated dome pavers.
9. Division 5 Section “Ornamental Handrails and Railings” for fabrication and installation requirements for pipe and tube railings

1.3 DEFINITIONS

A. Cast-in-Place Landscape Architectural Concrete: All exterior formed concrete shown on the Landscape Plans except for walkways requiring special concrete materials, formwork, placement, or finishes to obtain specified Landscape Architectural appearance.

B. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

C. Design Reference Sample: Sample designated by Landscape Architect in the Contract Documents that reflects acceptable surface quality and appearance of cast-in-place Landscape Architectural concrete.

D. Reveal: Projection of coarse aggregate from matrix or mortar after completion of exposure operations.

1.4 STANDARDS OF CONSTRUCTION

A. ACI 214 – Recommended Practice for Evaluation of Strength Tests Results of Concrete.

B. ACI 301 – Details and Detailing of Concrete Reinforcement.

C. ACI 303.1 – Standard Specification for Cast-in-Place Architectural Concrete.

D. ACI 304 – Recommended Practices for Measuring, Mixing, Transporting, and Placing of Concrete.

E. ACI 305 – Recommended Practices for Cold Weather Concreting.

F. ACI 306 – Recommended Practices for Hot Weather Concreting.

G. ACI 308 – Standard Practice for Curing Concrete.

H. ACI 347 – Recommended Practice for Concrete Formwork.

I. ASTM A615 – Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

J. ASTM C33 – Standard Specification for Concrete Aggregates.

K. ASTM C39 – Test Method for Compressive Strength of Cylindrical Concrete Specimens.

L. ASTM C94 – Standard Specification for Ready-Mix Concrete.

M. ASTM C136 – Method for Sieve Analysis of Fine and Coarse Aggregate.

N. ASTM C143 – Test Method for Slump of Portland Concrete Cement.

O. ASTM C150 – Standard Specification for Portland Cement.

P. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete.

Q. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.

R. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.

S. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.

T. ASTM C979 – Standard Specification for Pigments for Integrally Colored Concrete.

U. ASTM C1193 – Standard Guide for Use of Joint Sealants.

V. ASTM D1751 – Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-Extruding and Resilient Bituminous Types).

W. National Ready Mix Concrete Association, latest revision: “Certificate of Conformance for Concrete Production Facilities”.

1.5 SUBMITTALS

A. Comply with Division 01 “Submittal Procedures” and Division “Sustainable Design” Requirements.

B. Submittals for above items shall be made in one package. If submittals are judged incomplete or non-responsive to the directions of the Landscape Architect after three (3) submissions the Contractor shall be back charged for the Landscape Architects costs to process additional Submittals.

C. Product Data: Submit available Product/Material data, manufacturing source (name, address, and telephone number), and distributor source (name, address, and telephone number) for each type of material and product indicated:

1. Reinforcement and Forming Accessories
2. Cementitious materials
3. Aggregate materials (course and fine)
4. Chemical Admixtures
5. Concrete Curing materials
6. Dowels
7. Expansion joint filler material and joint sealant
8. Finish retardant
9. Integral color/ color admixture
10. Concrete paving surface sealant

D. Statement of Mix Design: Prepared by the batch plant servicing the Project, submit for each type or load delivered to Project. Include revised mix proportions when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments. Each Statement of Mix Design shall include following information:

1. Name, address, and telephone number of batch plant preparing Statement of Mix Design.
2. Date of Mix Design.
3. Project location.
4. Contractor requesting load delivery.
5. Mix Design Number.
6. Admixtures (as required).
7. Integral Color Admixtures (as required).
8. Gradations for sand and aggregate.
9. Material weights, specific gravity, and absolute volumes.
10. Basis of testing, i.e. UBC 2605 D4 and CBC Title 24 2604 D4.
11. Water/Cementitious Materials Ratio (W/CM Ratio).
12. Slump.
13. PSI Rating.

E. Formwork Shop Drawings: Show formwork construction including form-facing joints, rustications, construction and contraction joints, form joint-sealant details, form tie

locations and patterns, inserts and embedments, cutouts, cleanout panels, and other items that visually affect cast-in-place Landscape Architectural concrete.

F. Installer Qualifications:

1. Licensed California C-8 (Concrete) Contractor.

G. Certification that Landscape Architect's Reference panels have been reviewed and that materials and processes provided will achieve intended effects indicated on Landscape Architect's Reference panel.

H. Submittals for above items shall be made in one package. If submittals are judged incomplete or non-responsive to the directions of the Landscape Architect after three (3) submissions the Contractor shall be back charged for the Landscape Architect's costs to process additional Submittals.

I. Field quality-control test reports.

J. Minutes of preinstallation conference.

K. Delivery slips.

L. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

M. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1.6 QUALITY ASSURANCE

A. Source Limitations for Cast-in-Place Landscape Architectural Concrete: Obtain each color, size, type, and variety of concrete material and concrete mixture from one manufacturer with resources to provide cast-in-place Landscape Architectural concrete of consistent quality in appearance and physical properties.

B. The total estimated requirement of architectural aggregate plus anticipated losses and waste shall be procured from one source of supply. The Contractor will assure that the source of supply is adequate to provide, throughout the duration of the project, an aggregate which is uniform in size, color and shape. Should an aggregate be elected in which there is doubt about the quantity of a uniform supply, the Contractor shall require the supplier to remove the entire amount from the pit, mine or river and thoroughly mix and stockpile said aggregate for exclusive use of this project.

C. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

D. Mockups: Before casting Landscape Architectural concrete, build mockups to verify selections made under sample submittals and to demonstrate typical joints, surface

finish, texture, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups at the job site, 36” min length or 48” min. length if curved in the location indicated on the drawings or if not indicated, as directed by Landscape Architect.

2. Build mockups of each cast-in-place Landscape Architectural concrete Type as indicated on Drawings.

3. Build mockups using identical materials, design mix and methods to be used in the work.

4. Mix Design: The concrete mix design used to prepare the sample panels shall be identical to that used for the project's landscape architectural concrete

5. Demonstrate curing, cleaning, and protecting of cast-in-place Landscape Architectural concrete, finishes, and contraction joints, as applicable.

6. Mockups shall be cured a minimum of 10 days prior to review by the Landscape Architect.

7. Obtain Landscape Architect's approval of mockups before casting Landscape Architectural concrete.

8. The contractor shall be back charged for the costs of the Landscape Architect to review more than two (2) mock up attempts.

9. Remove mock ups from the job site when directed and dispose legally.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management And Coordination."

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place Landscape Architectural concrete to attend, including the following:

   a. Contractor's superintendent.

   b. Cast-in-place Landscape Architectural concrete subcontractor.

2. Review concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction joints, forms and form-removal limitations, reinforcement accessory installation, concrete repair procedures, and protection of cast-in-place Landscape Architectural concrete.

1.7 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

1.8 DELIVERY AND HANDLING

A. Conform to Division 01 “Product Requirements”.

B. Deliver, store, and handle reinforcement to prevent damage.

1.9 REGULATORY REQUIREMENTS

A. Testing: Slump tests shall be taken to certify compliance with mix design. Slump shall be in accordance ASTM C 143.

B. Mix design shall be in accordance with ACI 211-6.

C. Conform to applicable laws, codes, and regulations required by authorities having jurisdiction over the work.

1.10 SITE CONDITIONS

A. Do not place concrete when subbase surface temperature is less than 40 degrees F, nor when surface is wet.

1.11 COORDINATION

A. In accordance with Section 01315.

B. Ensure that irrigation sleeves, electrical conduit, food cart outlets, and other utility elements are accommodated and as-built located prior to pouring concrete.

1.12 INSPECTION OF SITE

A. Verify conditions at site affect Work of this Section, and take field measurements as required. Report major discrepancies between Drawings and field dimensions to City’s Authorized Representative prior to commencing work.

PART 2 - PRODUCTS

2.1 FORMING MATERIALS

A. General: Comply with Division 03 Section "Cast-In-Place Concrete" for formwork and other form-facing material requirements.

B. All forms shall be new; no reused or reconditioned forms will be permitted. Forms for landscape architectural concrete shall be built so that they are completely rigid, strong enough to withstand without deflection, movement or leakage, the high hydraulic pressures which result from rapid filling and heavy frequency vibration. All materials shall be new at start of work.

C. Fasteners shall be formed galvanized steel or other approved non-corrosive steel materials.

D. Form Joint Tape: Compressible foam tape; pressure sensitive; AAMA 800, "Specification 810.1, Expanded Cellular Glazing Tape"; minimum 1/4 inch (6 mm) thick.

E. Form Joint Sealant: Elastomeric sealant complying with ASTM C 920, Type M or S, Grade NS, that adheres to form joint substrates.

F. Form Sealer: Penetrating, clear, polyurethane wood form sealer formulated to reduce absorption of bleed water and prevent migration of set-retarding chemicals from wood.

1. Acceptable Manufacturers:
   a. W.R. Grace Company "Formfilm"
   b. Nox-Crete Chemicals, Inc. "Pre-Form"
   c. Hunt Process Co. "Seal Form-L"

G. Form-Release Agent: Commercially formulated colorless form-release agent that will not bond with, stain, or adversely affect Landscape Architectural concrete surfaces, that is compatible with the sealer and will not impair subsequent treatments of those surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

2. Final acceptance of form release agent depends on proven performance on mock up panels.

3. Acceptable Manufacturers:
   a. Atlas Release
   b. Bio Release Agent, Burke, Edoco.
   c. Enviroform, Conspec, Dayton Superior Company.
   d. Bio-Release EF, Conspec, Dayton Superior Company.
   e. Duogard II, W.R. Meadows, Inc.
   f. Greenplus Form Release Agent ES, Greenland Corporation.
   g. Soy Form Release and Natural Form Oil, Natural Soy, LLC.
   h. SOYsolv Concrete Form Release Agent, SOYsolv.
   i. Or equal.

H. Form Ties: Factory-fabricated, As indicated on the Drawings or ¼" snap ties or for types requiring extra support 3/8" dia she bolts compatible with 1" dia cones. Ties shall be designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

I. Stripping Gaskets: Resilient rectangular material non-absorbent and non-staining at junctions of formwork and at junctions for forms with columns and beams as required to permit removal and reuse of formwork without damage.

J. Form Gaskets: 1/8" x ½" adhesive backed foam tape.

1. Acceptable Manufacturers:
   a. Burke Company
   b. Norton Sealants
   c. Arlon Co.

K. Chairs and spacers: Solid plastic of color matching landscape architectural concrete

L. Reglets: "Type I Springlock Flashing Reglets" for casting into concrete, constructed from 3/16-inch thick stainless steel for exposed locations.

1. Acceptable Manufacturers:
   a. Fry Reglet Co.
   b. Westex Manufacturing Ltd., Vancouver, B.C.

2.2 STEEL REINFORCEMENT AND ACCESSORIES

A. General: Comply with Division 03 Section "Cast-In-Place Concrete" for steel reinforcement and other requirements for reinforcement accessories.

B. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 80 percent.

C. Supports for Reinforcement: Lightweight, strong, non-corrosive, durable, and impervious to water. Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement bars, welded wire fabric, and dowels in place, as manufactured from 100% recycled-content plastic or engineered resins from recycled ABS plastic, polycarbonates, and fiberglass.

1. Products & Manufacturers: Provide products by one (1) of the following:
   a. Rebar Supports, Eclipse Plastics Inc.
   b. Concrete Casting Plastic Rebar Supports, Build Global, Inc.
   c. Reinforcing Bar Supports, Shin Hwa Industrial Co.
   d. Plastic Rebar Supports, Plasticon International, Inc.
   e. Bar Lift Plastic Support, New Century Northwest.
   f. Aztec Composite Plastic Rebar Supports, Dayton Superior.
   g. Or equal.

2.3 ABRASIVE STAIR NOSINGS

A. Provide in contrasting colors, install at all treads and top landing of exterior stairs in compliance with California Building Code requirements.

B. Acceptable Manufacturer:

1. American Safety Tread Company, 800-245-4881

   a. Type 24

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type II.

   a. Fly Ash: ASTM C 618, Class F.

   b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

   c. Silica Fume: ASTM C 1240, amorphous silica.

B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse Aggregate Size: As indicated on the Drawings.

2. Gradation: Uniformly graded.

C. Normal-Weight Fine Aggregate: ASTM C 33 or ASTM C 144, manufactured or natural sand, from same source for entire Project.

D. Water: Potable, complying with ASTM C 94/C 94M except free of wash water from mixer washout operations.

2.5 ADMIXTURES

A. General: Admixtures shall be certified by the Manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other Admixtures. Use of Admixtures shall not relieve the Contractor of the designated concrete requirements, including strength.

B. Air-Entraining Admixture: ASTM C 260.

1. Products & Manufacturers: Provide products by one (1) of the following:
   a. Daravair 1000, Grace Construction Products, 800-433-0020.
   b. Micro-Air, Master Builders, Inc., 800-628-9990.
   c. Catexol™ A.E. 360, Axim Italcementi Group, 800-899-8795.
   d. Or equal.

C. Water-Reducing Admixture: Meet ASTM C494, Type A.

1. Products & Manufacturers: Provide products by one (1) of the following:
   a. WRDA, Grace Construction Products, 800-433-0020.
   b. Eucon NW, Euclid Chemical Co., 800-321-7628.
   c. ChemMasters Corp; Chemtard.
   d. Cormix Construction Chemicals: Type A Series.
   e. Euclid Chemical Company; Eucon WR-75.
   f. Or equal.

D. Shrinkage-Reducing Admixture: Meet ASTM C157.

1. Products & Manufacturers: Provide products by one (1) of the following:
   a. Eclipse, Grace Construction Products, 800-433-0020.
   b. Tetraguard, Master Builders, Inc., 800-628-9990.
   c. Or equal.

      a. or as selected by Landscape Architect from manufacturer's full range.

2.6 CURING MATERIALS

A. Moisture-Retaining Cover: One of the following complying with ASTM C 171:

1. Polyethylene Film (Clear or White Opaque).
2. White-Burlap-Polyethylene Sheet.

3. Reinforced Curing Paper (Regular or White).

2.7 CONCRETE PAVING SURAFACE SEALER

A. Sealer: Waterbased Clear siloxane or silane penetrating sealer for protection against food stain, water and oil. Acceptable products include, but not limited to:

1. Surebond “SB-5000 – Stain-blocking Invisible Sealer”
2. Prosoco “Stand Off SLX100 Water and Oil Repellent”
3. Glaze n’ Seal, “Stone Sealant Impregnator”
4. Glaze n’ Seal, “Stain Defense Sealer”
5. GST International “Stainblock Elite”

2.8 REPAIR MATERIALS

A. Bonding Agent: ASTM C 1059, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

B. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements.

1. Types I and II, non-load bearing and IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.9 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of cast-in-place Landscape Architectural concrete proportioned on basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Mix design shall be the responsibility of the Contractor.

2. Contractor shall employ a Testing Laboratory approved by the Landscape Architect under the active direction of the Civil Engineer, who shall determine mix designs to fulfill the specified requirements for strength, aggregate size and workability of concrete, and such designs shall be used in proportioning all structural concrete.

3. Mix designs shall be submitted to the Landscape Architect for review at least 10 days prior to scheduled concrete pour.

4. Review by the Landscape Architect shall not be considered unqualified approval, and shall not relieve the Contractor of his responsibility to furnish concrete of proper consistency and specified strengths.

5. Provide concrete of the strengths indicated in the structural general notes

B. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.

C. Proportion concrete mixtures as follows:

1. Compressive Strength (28 Days): As indicated on the Drawings or 3000 psi (20.7 MPa).

2. Maximum Water-Cementitious Materials Ratio: 0.46.

3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).

D. Cementitious Materials: For cast-in-place Landscape Architectural concrete exposed to deicers, limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements.

E. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.

F. Admixtures: Use admixtures according to manufacturer's written instructions.

G. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.10 CONCRETE MIXING

A. Ready-Mixed Landscape Architectural Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.

1. Clean equipment used to mix and deliver cast-in-place Landscape Architectural concrete to prevent contamination from other concrete.

2. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

2.11 ANTI GRAFFITI COATING

A. Unless otherwise specified in the drawings or indicated by the landscape architect, all landscape architectural concrete shall receive Anti Graffiti Coating, either manufacturer applied or contractor applied per the manufacturer’s instructions and requirements.

B. Basis-of-Design Product: Subject to compliance with requirements, provide the product by the following manufacturer:

1. Graffiti Solutions System by GSS Coatings, LLC , GSSCC-100 Clear Flat, or GSSCC-200 Pigmented Flat installed by a certified applicator, or approved equal. Refer to manufacturer’s recommendations for undercoat requirements based on material being coated. GSS Base coatings GSS-500 Aqualock Water Repellent and GSS-307 Base Coat as determined by Architect and GSS Coatings recommendations.

a. GSS Coatings LLC, 801-255-9505, contact Gordon Daw gordon@gsscoatings.com

b. If proposed equal is not pre-approved thirty (30) days prior to bid, then it will not be considered or accepted under any circumstances.

2. System Performance: Provide anti-graffiti coating system complying with the following:

   a. Permanent coating system. Coatings shall not require re application regardless of number of graffiti taggings during the life of the 10 year performance warranty period.

   b. Show no signs of deterioration or change of appearance after graffiti removal during the warranty period. No ghosting staining or shadowing.

   c. Capability of removing 100% of all types of paint and graffiti materials from treated surfaces without damaging the coating or the substrate.

   d. Upon graffiti removal, no evidence of graffiti shall remain.

   e. Capable of withstanding a minimum of 120 cleaning cycles over the same area without measurable coating deterioration.

   f. Shall not increase dirt pick-up of substrate.

   g. Meet the following test results for the following chemicals:

      1) MEK No effect after 5 days
      2) Carboxylic Acid No effect after 5 days
      3) 75% Phosphoric Acid No effect after 5 days
      4) 37% HCL 3 hours blister
      5) 50% Sulfuric Acid No effect after 5 days
      6) 20% NIT 68 hours blister
      7) Finish Sheen <5° on Gardner Gloss Meter
      8) ASTM B 117 and ASTM D 714 (salt spray minimum acceptable of 8000 hours.
      9) ASTM D 530 (hardness)
      10) ASTM D 412 (tensile strength and elongation)
      11) ASTM D 522 (pass 3/8 inch mandral)
      12) ASTM 968 (abrasion test)
      13) ASTM E 96 (vapor transmission)
      14) Water clear, non-yellowing, free of waxes and urethanes.
      15) Shall allow moisture vapor transmission

C. Application: Per manufacture recommendations.

D. Mock-up area to be completed and approved prior to application to remaining substrate.

E. VOC Classification: Provide materials that comply with the South Coast Air Quality Management District's VOC classification.

F. Graffiti Remover: GSS-400 Erasol®; Non-flammable, biodegradable, with a pH 7 - 8.5 and recyclable, allowing graffiti removal without the use of blasting equipment, hot water, or high pressure wash equipment. Furnish GSS-400 Erasol® graffiti removal materials in quantities described below.

   1. Quantity: One full case (12, 16 ounce bottles).

G. Warranty: 10 Year System Performance Warranty: Provide written warranty signed by manufacturer that exhibits defects in materials or workmanship. Defects are defined to include failure to withstand complete graffiti removal, ghosting, shadowing, chemical staining, yellowing, and normal environmental effects. Refer to GSS Coatings, LLC 10 Year Warranty. To obtain warranty service the purchaser must contact GSS Coatings, LLC in writing.

1. Warranty process to per GSS Coatings Warranty Procedures to include testing of treated substrates via Skype or FACETIME with GSS Coatings, LLC

2. Warranty period: 10 years from date of completion.

PART 3 - EXECUTION

3.1 FORMWORK

A. General: Comply with Division 03 Section "Cast-In-Place Concrete" for formwork, embedded items, and shoring and reshoring.

B. The design, engineering and construction of forms shall be the Contractor's responsibility.

C. Construct forms to shape, lines and dimensions of architectural concrete members. Spacing of studs, ties and other supporting members shall be such to support maximum pressures imposed by the wet concrete (mix). Final concrete surfaces shall conform to tolerances as specified.

D. Limit deflection of form-facing panels to not exceed ACI 303.1 requirements.

E. In addition to ACI 303.1 limits on form-facing panel deflection, limit cast-in-place Landscape Architectural concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

1. Class A, 1/8 inch (3.2 mm)

F. Fabricate forms to result in cast-in-place Landscape Architectural concrete that complies with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

G. Tolerances: In addition to ACI 117, comply with the following tolerances:

1. Tolerances shall not be cumulative.

2. Variation from plumb for lines and surface of columns, walls, beams and arises:

a. In any 10' length: 1/8".

b. Maximum for entire length: 1/2".

3. Variation from the level or from the indicated elevations of tops of slabs, beams, and arises:

a. Across Top: 1/8".

b. In any 10' length: 3/16".

c. In any bay or in any 20' length: 1/4".

d. Maximum for entire length: 1/2".

4. Deviation from Round:

a. Out of round, 1/4".

H. Failure to comply with these limits will result in the Contractor, at his expense, filling and/or grinding the sub-standard surfaces, or if this is deemed impossible by the City's Authorized Representative, then the concrete section shall be removed and reconstructed at no expense to the City.

I. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-in-place surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood rustications, keyways, reglets, recesses, and the like, for easy removal.

1. Seal form joints and penetrations at form ties with form joint tape or form joint sealant to prevent cement paste leakage.

2. Do not use rust-stained steel form-facing material.

J. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

K. Retain one of two options in first paragraph below. ACI 301 requires chamfers, unless otherwise indicated.

L. Do not chamfer exterior corners and edges of cast-in-place Landscape Architectural concrete.

M. Coat contact surfaces of wood rustications and chamfer strips with sealer before placing reinforcement, anchoring devices, and embedded items.

N. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

O. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

P. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

Q. Forms shall be tight to prevent concrete loss. Corner chamfer strips are not allowed, making mandatory especially tight well designed corners of the forms. Continuous girts and blocking shall be provided behind all plywood butt joints not backed.

R. All forms shall be cleaned of extraneous loose material with compressed air, and thoroughly inspected before use. Forms with clips, dents, damaged corners or edges,

scratches, gouges or other defects that will transfer to the concrete surface will be discarded. Forms shall be thoroughly wetted just before concrete placement. Have sufficient equipment available to allow for these procedures.

S. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

T. Coat contact surfaces of forms with surface retarder, according to manufacturer's written instructions, before placing reinforcement.

U. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and attach securely to prevent deflection and maintain stability of liners during concreting. Prevent form liners from sagging and stretching in hot weather. Seal joints of form liners and form liner accessories to prevent mortar leaks. Coat form liner with form-release agent.

3.2 REINFORCEMENT AND INSERTS

A. General: Comply with Division 03 Section "Cast-In-Place Concrete" for fabricating and installing steel reinforcement. Securely fasten steel reinforcement and wire ties against shifting during concrete placement.

B. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.3 REMOVING AND REUSING FORMS

A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.

1. Schedule form removal to maintain surface appearance that matches approved mockups.

B. Clean and repair surfaces of forms to be reused in the Work. Do not use split, frayed, delaminated, or otherwise damaged form-facing material. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for cast-in-place Landscape Architectural concrete surfaces.

D. Do not reuse forms for board form finish concrete.

3.4 JOINTS

A. Construction Joints: Install construction joints true to line with faces perpendicular to surface plane of cast-in-place Landscape Architectural concrete so strength and appearance of concrete are not impaired, at locations indicated or as approved by Landscape Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated.

2. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.

3. Space vertical joints in walls as indicated on the Drawings or 16'-0" max. on center as approved by the Landscape Architect. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

B. Contraction Joints: Form weakened-plane contraction joints true to line with faces perpendicular to surface plane of cast-in-place Landscape Architectural concrete so strength and appearance of concrete are not impaired, at locations indicated on the Drawings or 10'-0" on center as approved by Landscape Architect.

3.5 Joint Sealant:

A. Horizontal Applications: Meet ASTM C920, Type S, Grade P, Class 25, Use T, low-VOC, cold-applied, elastomeric polyurethane Joint Sealant for exterior applications. Color to match adjacent paving color finish.

B. Products & Manufacturers: Provide products by one (1) of the following:

1. Sika Corporation.
2. Tremco, Inc.
3. Sonneborn.
4. Pecora Corporation.
5. Or equal.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, form-release agent, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Landscape Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously between construction joints. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.

2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 303.1.

3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. Do not permit vibrators to contact forms.

E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents.

4. Do not use chemical accelerators unless otherwise specified and approved in design mixtures.

F. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.7 CONCRETE FINISHES, GENERAL

A. Landscape Architectural Concrete Finish: Match Landscape Architect's design reference sample, identified and described as indicated, to satisfaction of Landscape Architect.

B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces.

1. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

C. Maintain uniformity of special finishes over construction joints, unless otherwise indicated.

3.8 AS-CAST FORMED FINISHES

A. Broom Finish: Provide a fine-to-medium texture finish by striating the freshly cast float finished concrete surface with a soft bristle broom, perpendicular to line of traffic, to provide a uniform, consistent, fine-line texture.

1. Light to Medium Broom Finish: 1/16” etch depth or less

B. Smooth Trowel Finish: Provide a smooth finish by screeding freshly poured concrete. After the bleed water and sheen have disappeared, used a tooled edge for the edges of the concrete. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Immediately smooth the surface with a steel concrete trowel to bring the concrete to a smooth uniform texture.

3.9 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 for hot-weather protection during curing.

B. Begin curing cast-in-place Landscape Architectural concrete immediately after removing forms from concrete. Cure according to ACI 308.1, by one or a combination of the following methods that will not mottle, discolor, or stain concrete:

1. Moisture Curing: Keep exposed surfaces of cast-in-place Landscape Architectural concrete continuously moist for not less than seven days with the following materials:

a. Water.

b. Continuous water-fog spray.

c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period; use cover material and waterproof tape.

3. Curing Compound: Mist concrete surfaces with water. Apply curing compound uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.10 SEALER

A. Sealer: Apply uniformly in two coats in continuous operations according to manufacturer's written instructions. Allow first coat to dry before applying second coat, at 90-degrees to the direction of the first coat using same application methods and rates.

1. Begin sealing dry surface no sooner than 14 days after concrete placement or per the manufacturer’s recommendations.

2. Allow stained concrete surfaces to dry before applying sealer.

B. Mix slip-resistant additive thoroughly in sealer before application according to manufacturer's written instructions. Stir sealer occasionally during application to joint sealant.

C. Prior to applying the sealant, the joints shall be cleaned of all mortar, laitance, scale, dirt, dust, oil, curing compound, and other foreign materials. The joints and adjacent surfaces shall be dry and where called for by the manufacturer, prepared with a primer. The joints shall be filled from bottom to top without voids. All adjoining surfaces shall be protected during the sealing operations and any stains, marks, or damage resulting from the sealant operations shall be corrected.

3.11 FIELD QUALITY CONTROL

A. General: Comply with Division 03 Section "Cast-In-Place Concrete" for field quality-control requirements.

3.12 REPAIRS, PROTECTION, AND CLEANING

A. Repair and cure damaged finished surfaces of cast-in-place Landscape Architectural concrete when approved by Landscape Architect. Match repairs to color, texture, and uniformity of surrounding surfaces and to repairs on approved mockups.

1. Remove and replace cast-in-place Landscape Architectural concrete that cannot be repaired and cured to Landscape Architect's approval.

B. Protect corners, edges, and surfaces of cast-in-place Landscape Architectural concrete from damage; use guards and barricades.

C. Protect cast-in-place Landscape Architectural concrete from staining, laitance, and contamination during remainder of construction period.

D. Clean cast-in-place Landscape Architectural concrete surfaces after finish treatment to remove stains, markings, dust, and debris.

E. Wash and rinse surfaces according to concrete finish applicator's written recommendations. Protect other Work from staining or damage due to cleaning operations.

1. Do not use cleaning materials or processes that could change the appearance of cast-in-place Landscape Architectural concrete finishes.

END OF SECTION 033300

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes unit masonry assemblies consisting of the following:

1. Concrete masonry units (CMUs).
2. Decorative concrete masonry units.
3. Pre-faced concrete masonry units.

B. See Division 05 Section "Metal Fabrications" for furnishing steel lintels and shelf angles for unit masonry.

C. See Division 07 Section "Sheet Metal Flashing and Trim" for furnishing manufactured reglets installed in masonry joints for metal flashing.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For reinforcing steel. Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls. Elevations of each wall to include locations of reinforcing steel and celcs where conduit are to be placed.

C. Samples for each type and color of exposed masonry units and colored mortars.

D. Material Certificates: For each type of product indicated. Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards.

1. For masonry units include material test reports substantiating compliance with requirements.

E. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1.3 QUALITY ASSURANCE

A. Preconstruction Testing Service: Contractor shall engage a qualified independent testing agency to perform preconstruction testing indicated below.

1. Concrete Masonry Unit Test: For each type of unit required, per ASTM C 140.
2. Mortar Test (Property Specification): For each mix required, per ASTM C 780.
3. Grout Test (Compressive Strength): For each mix required, per ASTM C 1019.

B. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

C. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects.

1. Build sample panels for typical exterior wall in sizes approximately 48 inches (1200 mm) x 48 inches (1200 mm) high.

1.4 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.
3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 COLORS, TEXTURES, AND PATTERNS

A. Exposed Masonry Units: As indicated on construction documents.

2.3 CONCRETE MASONRY UNITS (CMUs)

A. Shapes: Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

B. Integral Water Repellent: Provide units made with liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength for exposed units.

1. Available Products:

a. Addiment Incorporated; Block Plus W-10.
b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Dry-Block.
c. Master Builders, Inc.; Rheopel.

C. Concrete Masonry Units: ASTM C 90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1500 psi.
2. Weight Classification: Medium weight.
3. Pattern and Texture for Decorative Units:

a. Standard pattern, split-face finish. Include split face on exposed ends.

2.4 CONCRETE AND MASONRY LINTELS

A. General: Provide concrete or masonry lintels, as indicated, complying with requirements below.

B. Concrete Lintels: Precast or formed-in-place concrete lintels complying with requirements in Division 03 Section "Cast-in-Place Concrete."

C. Masonry Lintels: Made from bond beam concrete masonry units with reinforcing bars placed as indicated and filled with coarse grout.

2.5 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction.

B. Masonry Cement: ASTM C 91.

C. Mortar Pigments: Iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.

1. Available Products:

a. Bayer Corporation, Industrial Chemicals Div.; Bayferrox Iron Oxide Pigments.
b. Davis Colors; True Tone Mortar Colors.
c. Solomon Grind-Chem Services, Inc.; SGS Mortar Colors.

D. Colored Cement Product: Packaged blend made from portland cement and lime or masonry cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
2. Available Products:

    a. Colored Portland Cement-Lime Mix:

        1) Capital Materials Corporation; Riverton Portland Cement Lime Custom Color.
        2) Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
        3) Lafarge North America Inc.; Eaglebond.
        4) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.

    b. Colored Masonry Cement:

        1) Capital Materials Corporation; Flamingo Color Masonry Cement.
        2) Essroc, Italcementi Group; Brixment-in-Color.
        3) Holcim (US) Inc.; Rainbow Mortamix Custom Color Masonry Cement.
        4) Lehigh Cement Company; Lehigh Custom Color Masonry Cement.
        5) National Cement Company, Inc.; Coosa Masonry Cement.

E. Aggregate for Mortar: ASTM C 144.

1. For joints less than 1/4 inch (6.5 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

F. Aggregate for Grout: ASTM C 404.

G. Epoxy Pointing Mortar: ASTM C 395, epoxy-resin-based material formulated for use as pointing mortar for structural-clay tile facing units.

H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Available Products:

    a. Addiment Incorporated; Mortar Kick.
    b. Euclid Chemical Company (The); Accelguard 80.
    c. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Morset.
    d. Sonneborn, Div. of ChemRex; Trimix-NCA.

I. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with concrete masonry units, containing integral water repellent by same manufacturer.

1. Available Products:

    a. Addiment Incorporated; Mortar Tite.
    b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.

J. Water: Potable.

2.6 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M Grade 60 (Grade 420).

1. Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.188-inch- (4.8-mm-) diameter, hot-dip galvanized, carbon-steel continuous wire.

2.7 TIES AND ANCHORS

A. Materials:

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153/A 153M, Class B-2 coating.
2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M.
3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch (16-mm) cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches (50 mm) parallel to face of veneer.

C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches (100 mm) wide.

1. Wire: Fabricate from indicated diameter, hot-dip galvanized steel wire.

D. Partition Top anchors: 0.097-inch- (2.5-mm-) thick metal plate with 3/8-inch- (10-mm-) diameter metal rod 6 inches (150 mm) long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

E. Rigid Anchors: Fabricate from steel bars 1-1/2 inches (38 mm) wide by 1/4 inch (6.4 mm) thick by 24 inches (600 mm) long, with ends turned up 2 inches (50 mm) or with cross pins.

1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

2.8 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing**,** where flashing is exposed or partly exposed and where indicated, complying with Division 07 Section "Sheet Metal Flashing and Trim."

1. Metal Drip Edges: Fabricate from stainless steel. Extend at least 3 inches (75 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees.
2. Metal Flashing Terminations: Fabricate from stainless steel. Extend at least 3 inches (75 mm) into wall and out to exterior face of wall. At exterior face of wall, bend metal back

on itself for 3/4 inch (19 mm) and down into joint 3/8 inch (10 mm) to form a stop for retaining sealant backer rod.

3. Metal Expansion-Joint Strips: Fabricate from stainless steel to shapes indicated.

B. Flexible Flashing: For flashing not exposed to the exterior, use one of the following, unless otherwise indicated:

1. Copper-Laminated Flashing: 5-oz./sq. ft. (1.5-kg/sq. m) copper sheet bonded with asphalt between 2 layers of glass-fiber cloth.

a. Products:

1) Advanced Building Products Inc.; Copper Fabric Flashing.
2) AFCO Products Inc.; Copper Fabric.
3) Hohmann & Barnard, Inc.; H & B C-Fab Flashing.
4) Phoenix Building Products; Type FCC-Fabric Covered Copper.
5) Polytite Manufacturing Corp.; Copper Fabric Flashing.
6) Sandell Manufacturing Co., Inc.; Copper Fabric Flashing.
7) York Manufacturing, Inc.; York Copper Fabric Flashing.

C. Solder and Sealants for Sheet Metal Flashings: As specified in Division 07 Section "Sheet Metal Flashing and Trim."

D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from neoprene, urethane or PVC.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Weep/Vent Products: Use one of the following, unless otherwise indicated:

1. Rectangular Plastic Weep/Vent Tubing: Clear butyrate, 3/8 by 1-1/2 by 3-1/2 inches (9 by 38 by 89 mm) long.
2. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe, in color selected from manufacturer's standard.

a. Available Products:

1) Advanced Building Products Inc.; Mortar Maze weep vent.
2) Dayton Superior Corporation, Dur-O-Wal Division; Cell Vents.

3) Heckmann Building Products Inc.; No. 85 Cell Vent.
4) Hohmann & Barnard, Inc.; Quadro-Vent.
5) Wire-Bond; Cell Vent.

3. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe; in color selected from manufacturer's standard.

a. Available Products:

1) Mortar Net USA, Ltd.; Mortar Net Weep Vents.

E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Provide one of the following configurations:

a. Strips, full-depth of cavity and 10 inches (250 mm) wide, with dovetail shaped notches 7 inches (175 mm) deep.
b. Strips, not less than 1-1/2 inches (38 mm) thick and 10 inches (250 mm) wide, with dimpled surface designed to catch mortar droppings and prevent weep holes from being clogged with mortar.
c. Sheets or strips full depth of cavity and installed to full height of cavity.

2. Available Products:

a. Advanced Building Products Inc.
b. Archovations, Inc.; CavClear Masonry Mat.
c. Dayton Superior Corporation, Dur-O-Wal Division; Polytite MortarStop.
d. Mortar Net USA, Ltd.; Mortar Net.

2.10 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains from new masonry without damaging masonry. Use product approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Available Manufacturers:

a. Diedrich Technologies, Inc.
b. EaCo Chem, Inc.
c. ProSoCo, Inc.

2.11 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.

2. Limit cementitious materials in mortar for exterior and reinforced masonry to portland cement and lime.
3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Mortar for Unit Masonry: Comply with ASTM C 270 Property Specification.

1. For masonry below grade or in contact with earth, use Type S.
2. For reinforced masonry, use Type S.
3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type S.

C. Pigmented Mortar: Use colored cement product as indicated on construction documents.

1. Pigments shall not exceed 10 percent of portland cement by weight.
2. Pigments shall not exceed 5 percent of masonry cement by weight.

D. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated on construction documents.
2. Provide grout with a slump of 8 to 11 inches (200 to 280 mm) as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Use full-size units without cutting if possible. If cutting is required, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

C. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

D. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:

1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.

3.2 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

D. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated.

E. Fill cores in hollow concrete masonry units with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

3.3 MORTAR BEDDING AND JOINTING

A. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

C. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

3.4 COMPOSITE MASONRY

A. Bond wythes of composite masonry together using one of the following methods:

1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 2.67 sq. ft. (0.25 sq. m) of wall area spaced not to exceed 36 inches (914 mm) o.c. horizontally and 16 inches (406 mm) o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches (305 mm) of openings and space not more than 36 inches (915 mm) apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches (610 mm) o.c. vertically.
2. Masonry Joint Reinforcement: Installed in horizontal mortar joints.
    a. Where bed joints of both wythes align, use as indicated on construction documents.
    b. Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement as indicated on construction documents.

B. Collar Joints: Solidly fill collar joints by parging face of first wythe that is laid and shoving units of other wythe into place.

C. Corners: Provide interlocking masonry unit bond in each wythe and course at corners, unless otherwise indicated.

D. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:

1. Provide individual metal ties not more than 16 inches (406 mm) o.c.
2. Provide continuity with masonry joint reinforcement by using prefabricated T-shaped

3.5 MASONRY JOINT REINFORCEMENT

A. General: Install in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).

B. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

3.6 ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Provide an open space not less than 1/2 inch (13 mm) in width between masonry and structural member, unless otherwise indicated.
2. Anchor masonry to structural members with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated.

3.7 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to wall framing and concrete and masonry backup with seismic masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached and seismic anchors to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners.
2. Embed tie sections connector sections and continuous wire in masonry joints. Provide not less than 2 inches (50 mm) of air space between back of masonry veneer and face of sheathing.
3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
4. Space anchors as indicated. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 36 inches (914 mm), around perimeter.

3.8 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Install flashing as follows, unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing as recommended by flashing manufacturer.
2. At lintels and shelf angles, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to top of metal drip edge.
4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to top of metal flashing termination.

C. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Use specified weep/vent products or open head joints as indicated to form weep holes.
2. Space weep holes 24 inches (600 mm) o.c., unless otherwise indicated.
3. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.

D. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in Part 2 "Miscellaneous Masonry Accessories" Article.

E. Install vents in head joints in exterior wythes at spacing indicated.

3.9 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches (1520 mm).

3.10 FIELD QUALITY CONTROL

A. Inspectors: Contractor shall engage qualified independent inspectors to perform inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform inspections.

1. Place grout only after inspectors have verified compliance of grout spaces and grades, sizes, and locations of reinforcement.

B. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections indicated below and prepare test reports:

1. Payment for these services will be made as indicated

C. Testing Frequency: One set of tests for each 5000 sq. ft. (465 sq. m) of wall area or portion thereof.

D. Concrete Masonry Unit Test: For each type of unit provided, per ASTM C 140.

E. Mortar Test (Property Specification): For each mix provided, per ASTM C 780. Test mortar for mortar air content and compressive strength.

F. Grout Test (Compressive Strength): For each mix provided, per ASTM C 1019.

3.11 CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
2. Protect adjacent surfaces from contact with cleaner.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
4. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.12 MASONRY WASTE DISPOSAL

A. Waste Disposal as Fill Material: Dispose of masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, in conformance with 017419 "Construction Waste Management and Disposal.

END OF SECTION 042000

SECTION 042300 - GLASS UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes glass block set in glass-block grid systems.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: Glass-block.

1.3 QUALITY ASSURANCE

A. Fire-Rated Glass Unit Masonry Assemblies: Assemblies listed by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to UBC Standard 7-4.

1. Test Pressure: After 10 minutes into the test, neutral pressure level in furnace shall be located so that at least two-thirds of test specimen is above the neutral pressure plane.

PART 2 - PRODUCTS

2.1 GLASS BLOCK

A. Hollow Glass Block:

1. Basis-of-Design Product: The design for hollow glass block is based on manufacturer's designations indicated on Drawings. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

a. Seves Glass Block, Inc., 1213 Medina Road, Medina, Ohio 44256, www.gba product.com

2. Glass Color: Frosted to match sample.
3. Surface: Light diffusive, smooth on inner face.
4. Surface: Vertical ribbed (fluted) on outer face to match sample.
5. Unit Sizes: Manufacturer's standard sizes corresponding to nominal sizes of 12” x 12” x 4”.

2.2 GLASS-BLOCK GRID SYSTEMS

A. Sealant: Product recommended by glass-block grid system manufacturer.

1. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II, natural color, white, or a blend to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Masonry Cement: ASTM C 91.

D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.

E. Colored Cement Product: Packaged blend made from portland cement and lime or masonry cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.

F. Aggregate: ASTM C 144, with 100 percent passing No. 8 sieve.

1. For pointing mortar and joints narrower than 1/4 inch, use aggregate graded with 100 percent passing No. 16 sieve.
2. White Aggregates: Natural white sand or crushed white stone.
3. Colored Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

G. Water-Repellent Admixture: Manufacturer's standard dry mixture of stearates, water-reducing agents, and fine aggregates intended to reduce capillarity in mortar.

H. Water-Repellent Admixture: Liquid polymeric water-repellent mortar admixture that does not reduce flexural bond strength of mortar.

I. Water: Potable.

2.4 GLASS UNIT MASONRY ACCESSORIES

A. Panel Reinforcement: Ladder-type units, butt welded, not lapped and welded; complying with ASTM A 951 in straight lengths of not less than 10 feet, and as follows:

1. Exterior Walls: As detailed.

B. Sealant Accessories: Provide sealant accessories that comply with applicable requirements in Division 07 Section "Joint Sealants."

2.5 MORTAR MIXES

A. General: Do not use admixtures, unless otherwise indicated.

1. For mortar in exterior panels, use water-repellent admixture according to admixture manufacturer's written instructions.
2. Limit cementitious materials in mortar to portland cement and lime.

B. Mortar for Glass Unit Masonry Assemblies: Comply with ASTM C 270, Proportion Specification for Type S mortar.

C. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

D. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.

PART 3 - EXECUTION

3.1 INSTALLING GLASS BLOCK WITH MORTAR

A. Apply a heavy coat of asphalt emulsion to sill and adhere expansion strips to jambs and heads with asphalt emulsion. Allow asphalt emulsion to dry before placing mortar. Trim expansion strips to width required to fit glass block and to full lengths of heads and jambs.

B. Set glass block with completely filled bed and head joints, with no furrowing, accurately spaced and coordinated with other construction. Maintain 1/4-inch exposed joint widths, unless otherwise indicated.

C. Install panel reinforcement in horizontal joints at spacing indicated and continuously from end to end of panels; comply with the following requirements:

1. Vertical Spacing of Panel Reinforcement for Exterior Panels: Every other course but not more than 16 inches o.c. starting with first course above sill.
2. Vertical Spacing of Panel Reinforcement for Interior Panels: Not more than 16 inches o.c.
3. Do not bridge expansion joints with panel reinforcement.
4. Place panel reinforcement in joints immediately above and below all openings within glass unit masonry assemblies.
5. Lap panel reinforcement not less than 6 inches if more than 1 length is necessary.

D. Install panel anchors at locations indicated and in same horizontal joints where panel reinforcement occurs. Extend panel anchors at least 12 inches into joints, and bend within expansion joints at edges of panels and across the head. Attach panel anchors as indicated.

E. Use plastic spacers or temporary wedges in mortar joints to produce uniform joint widths and to prevent mortar from being squeezed out of joints.

F. Keep expansion joints free of mortar.

G. Rake out joints indicated to be pointed to a uniform depth sufficient to accommodate pointing material, but not less than joint width.

1. Point joints at both faces of exterior panels with mortar.
2. Point joints at both faces of exterior panels with sealant.
3. Point joints at both faces of exterior and interior panels with sealant.

H. Point joints with mortar by filling raked joints and voids. Place and compact pointing mortar in layers not more than thick. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.

1. Tool exposed joints slightly concave when pointing mortar is thumbprint hard.

I. Point joints by filling with sealant to comply with requirements in Division 07 Section "Joint Sealants."

J. Install sealant at jambs, heads, mullions and other locations indicated. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

3.2 GLASS-BLOCK GRID SYSTEM INSTALLATION

A. General: Install glass-block grid systems according to manufacturer's written instructions.

B. Window and Wall System Installation: Assemble grid system, apply continuous sealant bead to back of window Z-bar, place in position, adjust as needed to make grid level and plumb, and fasten to substrate.

1. Insert glass blocks into vinyl glass-block boots and carefully insert into grid from exterior side. Install blocks firmly against T-bars without deforming boots.
2. Apply sealant to completely fill channel around each glass block, and tool flush with exterior surface. Remove excess sealant and smears.

3.3 CLEANING

A. Perform final cleaning of glass unit masonry assemblies when surface is not exposed to direct sunlight. Start at top of panel using generous amounts of clean water. Remove water with clean, dry, soft cloths; change cloths frequently to eliminate dried mortar particles and aggregate.

END OF SECTION 042300

SECTION 044300 - STONE MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following applications of stone masonry:

1. Adhered to unit masonry backup.

B. Related Sections:

1. Division 04 Section "Unit Masonry"

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1. For stone varieties proposed for use on Project, include test data indicating compliance with physical properties specified or required by referenced ASTM standards.

B. Samples:

1. For each stone type indicated.
2. For each color of mortar required.

1.3 PROJECT CONDITIONS

A. Protection of Stone Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 QUARTZ-BASED STONE

A. Quartz-Based Stone: Comply with ASTM C 616.

1. Products: Basis of design product. Subject to compliance with requirements, provide the following or approved equal:

a. Panther Stone: Flagstone. Distributed by RCP Block, 8240 Broadway, Lemon Grove, CA, 91945.

2.2 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Masonry Cement: ASTM C 91.

D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in stone masonry mortar.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Davis Colors; True Tone Mortar Colors.
b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
c. Solomon Colors; SGS Mortar Colors.

E. Colored Cement Product: Packaged blend made from portland cement and lime or masonry cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Formulate blend as required to produce color as selected by Architect from manufacturer's standard colors.
2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Colored Masonry Cement:

1) Essroc, Italcementi Group; Brixment-in-Color.
2) Holcim (US) Inc.; Rainbow Mortamix Custom Color Masonry Cement.
3) Lafarge North America; Florida Custom Color Masonry or Magnolia Masonry Cement.
4) Lehigh Cement Company; Lehigh Custom Color Masonry Cement.

F. Aggregate: ASTM C 144 and as follows:

1. For pointing mortar, use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.
2. White Aggregates: Natural white sand or ground white stone.
3. Colored Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.

G. Latex Additive: Manufacturer's standard acrylic-resin water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement mortar bed, and not containing a retarder.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Boiardi Products Corporation.
b. Bonsal.
c. Bostik Findley Inc.
d. C-Cure.
e. Custom Building Products.
f. DAP Inc.
g. Laticrete International, Inc.
h. MAPEI Corp.
i. Summitville Tiles, Inc.
j. TEC Specialty Construction Brands; H. B. Fuller Company.

H. Water: Potable.

2.3 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide galvanized sheet metal flashing where indicated, complying with SMACNA's "Architectural Sheet Metal Manual and Division 07 Section "Sheet Metal Flashing and Trim".

2.4 MISCELLANEOUS MASONRY ACCESSORIES

A. Cementitious Damp proofing: Cementitious formulations that are recommended by ILI and that are nonstaining to stone, compatible with joint sealants, and noncorrosive to veneer anchors and attachments.

B. Expanded Metal Lath: 3.4 lb/sq. yd. (1.8 kg/sq. m), self-furring, diamond-mesh lath complying with ASTM C 847. Fabricate from structural-quality, zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G60 (Z180).

2.5 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar and grout stains, efflorescence, and other new construction stains from stone masonry surfaces without discoloring or damaging masonry surfaces; expressly approved for intended use by cleaner manufacturer and stone producer.

1. Manufacturers: As recommended by the stone manufacturer and distributer, and subject to compliance with requirements,

2.6 MORTAR MIXES

A. General: Do not use admixtures unless otherwise indicated.

1. Do not use calcium chloride.
2. Limit cementitious materials in mortar to Portland cement and lime.
3. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding water. Then mix again, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

B. Mortar for Stone Masonry: Comply with ASTM C 270, Proportion Specification.

1. Mortar for Setting Stone: Type N.
2. Mortar for Pointing Stone: Type N.

C. Latex-Modified Portland Cement Setting Mortar: Proportion and mix portland cement, aggregate, and latex additive to comply with latex-additive manufacturer's written instructions.

D. Cement-Paste Bond Coat: Mix either neat cement and water or cement, sand, and water to a consistency similar to that of thick cream.

1. For latex-modified Portland cement setting-bed mortar, substitute latex admixture for part or all of water, according to latex-additive manufacturer's written instructions.

E. Mortar for Scratch Coat over Metal Lath: 1 part Portland cement, 1/2 part lime, 5 parts loose damp sand, and enough water to produce a workable consistency.

F. Mortar for Scratch Coat over Unit Masonry: 1 part Portland cement, 1 part lime, 7 parts loose damp sand, and enough water to produce a workable consistency.

G. Pigmented Mortar: Use colored cement product as selected from manufacturer’s full range.

1. Pigments shall not exceed 5 percent of masonry cement by weight.

2.7 FABRICATION

A. Cut and/or select stone to produce pieces of thickness, size, and shape indicated, including details on Drawings. Dress joints (bed and vertical) straight and at right angle to face unless otherwise indicated.

B. Gage backs of stones for adhered veneer if more than 81 sq. in. (522 sq. cm) in area.

C. Shape stone for type of masonry (pattern) as follows:

1. Uncoursed rubble (fieldstone).

D. Finish exposed faces and edges of stone to comply with requirements indicated for finish and to match approved samples and mockups.

1. Finish: Natural cleft (flagstone).

PART 3 - EXECUTION

3.1 PREPARATION

A. Accurately mark stud centerlines on face of weather-resistant sheathing paper before beginning stone installation.

3.2 SETTING OF STONE MASONRY, GENERAL

A. Perform necessary field cutting and trimming as stone is set.

1. Use power saws to cut stone that is fabricated with saw-cut surfaces.
2. Use hammer and chisel to split stone that is fabricated with split surfaces.

B. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication, or that is otherwise unsuitable for intended use.

C. Arrange stones in uncoursed rubble pattern with joint widths within tolerances indicated. Insert small stones into spaces between larger stones as needed to produce joints as uniform in width as practical.

D. Arrange stones with color and size variations uniformly dispersed for an evenly blended appearance.

E. Maintain uniform joint widths except for variations due to different stone sizes and where minor variations are required to maintain bond alignment if any. Lay walls with joints not less than 3/8 inch (10 mm) at narrowest points or more than 1-1/2 inches (38 mm) at widest points.

F. Provide sealant joints of widths and at locations indicated.

1. Keep sealant joints free of mortar and other rigid materials.
2. Sealing joints is specified in Division 07 Section "Joint Sealants."

G. Install embedded flashing and weep holes at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
1. At CMU backing, extend flashing through stone masonry, turned up a minimum of 4 inches (100 mm).
2. At lintels and shelf angles, extend flashing full length of lintels and angles but not less than 6 inches (150 mm) at each end.
3. At sills, extend flashing not less than 4 inches (100 mm) at ends.
4. At ends of head and sill flashing turn up not less than 2 inches (50 mm) to form end dams.

5. Extend sheet metal flashing 1/2 inch (13 mm) beyond face of masonry at exterior and turn flashing down to form a drip.
6. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to top of metal drip edge.

H. Coat limestone with cementitious dampproofing as follows:

1. Stone at Grade: Beds, joints, and back surfaces to at least 12 inches (300 mm) above finish-grade elevations.
2. Stone Extending below Grade: Beds, joints, back surfaces, and face surfaces below grade.

I. Place weep holes and vents in joints where moisture may accumulate, including at base of cavity walls, above shelf angles, and at flashing.

1. Use wicking material or open joints to form weep holes.
2. Use wicking material to form weep holes above flashing at concrete lintels. Turn wicking down at lip of sill to be as inconspicuous as possible.
3. Space weep holes 16 inches (400 mm).

3.3 CONSTRUCTION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/2 inch in 40 feet (13 mm in 12 m) or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet (6 mm in 6 m) or more.

B. Variation from Level: For lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet (6 mm in 6 m).

C. Variation of Linear Building Line: For position shown in plan, do not exceed 1/2 inch in 20 feet (13 mm in 6 m) or more.

3.4 INSTALLATION OF ADHERED STONE MASONRY VENEER

A. Install lath over unit masonry and concrete to comply with ASTM C 1063.

B. Install scratch coat over metal lath 3/8 inch (10 mm) thick to comply with ASTM C 926.

C. Coat backs of stone units and face of scratch coat with cement-paste bond coat, then butter both surfaces with setting mortar. Use sufficient setting mortar so a slight excess will be forced out the edges of stone units as they are set. Tap units into place, completely filling space between units and scratch coat.

D. Rake out joints for pointing with mortar to depth of not less than 1/2 inch (13 mm). Rake joints to uniform depths with square bottoms and clean sides.

3.5 POINTING

A. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply pointing mortar in layers not more than 3/8 inch (10 mm) deep until a uniform depth is formed.

B. Point stone joints by placing and compacting pointing mortar in layers not more than 3/8 inch (10 mm) deep. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.

C. Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce the following joint profile:

1. Joint Profile: Smooth, flat face slightly below edges of stone.

3.6 ADJUSTING AND CLEANING

A. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes.
3. Protect adjacent stone, concrete and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
4. Wet wall surfaces with water before applying cleaner; remove cleaner promptly by rinsing thoroughly with clear water.
5. Clean stone masonry by bucket and brush hand-cleaning method described in BIA Technical Note No. 20 Revised II, using job-mixed detergent solution, and a s recommended by the distributer.

3.7 EXCESS MATERIALS AND WASTE

A. Dispose of masonry waste, including mortar and excess sand according to Section 017419, “Construction Waste Management and Disposal.

END OF SECTION 044300

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes structural steel and grout.

1.2 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand ASD-service or LRFD loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using details indicated and AISC's "Manual of Steel Construction, Load and Resistance Factor Design," Volume 2, Part 9.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittal:

1. Product Data for Credit MR 4.1: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.

a. Include statement indicating costs for each product having recycled content.

C. Shop Drawings: Show fabrication of structural-steel components.

D. Welding certificates.

E. Mill test reports.

F. Source quality-control test reports.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category Sbd.

B. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

C. Comply with applicable provisions of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 50 percent.

B. W-Shapes: ASTM A 992/A 992M, Grade 50 (345).

C. Channels, Angles - Shapes: ASTM A 36/A 36M.

D. Plate and Bar: ASTM A 36/A 36M

E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

F. Steel Pipe: ASTM A 53/A 53M, Grade B.

G. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.

1. Finish: Plain, Hot-dip zinc coating, ASTM A 153/A 153M, Class C, Mechanically deposited zinc coating, ASTM B 695, Class 50, as indicated. Painted where exposed to view.
2. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8,) compressible-washer type.

a. Finish: Plain, Mechanically deposited zinc coating, ASTM B 695, Class 50. Mechanically deposited zinc coating, ASTM B 695, Class 50, baked epoxy coated. Painted where exposed to view.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavy hex steel structural bolt; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers, plain.

1. Direct-Tension Indicators: ASTM F 959, Type 490 (ASTM F 959M,) Type 10.9, compressible-washer type, plain.

C. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy hex head steel structural bolts with splined ends; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.

1. Finish: Plain or Mechanically deposited zinc coating, ASTM B 695, Class 50, as indicated. Painted where exposed to view.

D. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.

E. Headed Anchor Rods: ASTM F 1554, Grade 36, or ASTM F 1554, Grade 55, weldable, straight.

1. Finish: Plain, Hot-dip zinc coating, ASTM A 153/A 153M, Class C, or Mechanically deposited zinc coating, ASTM B 695, Class 50, as indicated.

F. Threaded Rods: ASTM A 36/A 36M.

1. Finish: Plain, Hot-dip zinc coating, ASTM A 153/A 153M, Class C, or Mechanically deposited zinc coating, ASTM B 695, Class 50, as indicated

2.3 PRIMER

A. Primer: SSPC-Paint 25, Type II, iron oxide, zinc oxide, raw linseed oil, and alkyd.

B. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.

2.4 GROUT

A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings -- Allowable Stress Design and Plastic Design, and Load and Resistance Factor Design Specification for Structural Steel Buildings."

B. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Slip critical.

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials.
5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

D. Painting: Where exposed to view paint with high-gloss enamel. Color as indicated or as selected from manufacturer’s full range.

2.8 SOURCE QUALITY CONTROL

A. Contractor shall engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports. Comply with testing and inspection requirements of Part 3, Article "Field Quality Control."

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 for stud welding.

PART 3 - EXECUTION

3.1 ERECTION

A. Examination: Verify elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design, and Load and Resistance Factor Design Specification for Structural Steel Buildings."

C. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.

1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of base plate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and base or bearing plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

D. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.2 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Slip critical.

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design, and Load and Resistance Factor Design Specification for Structural Steel Buildings" for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Miscellaneous steel framing and supports.
2. Prefabricated building columns.
3. Loose bearing and leveling plates.
4. Miscellaneous steel trim.
5. Metal bollards.
6. Pipe guards.
7. Bicycle racks.

B. See Division 05 Section "Metal Stairs" for metal-framed stairs.

C. See Division 05 Section "Pipe and Tube Railings" for metal pipe and tube railings.

1.2 SUBMITTALS

A. Product Data: For the following:

1. Prefabricated building columns.
2. Grout.

B. Shop Drawings: Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

C. Templates: For anchors and bolts.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.
3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.

B. Ferrous Metals:

1. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
2. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
3. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
4. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
5. Rolled-Stainless-Steel Floor Plate: ASTM A 793.
6. Abrasive-Surface Floor Plate: Steel plate with abrasive granules rolled into surface or with abrasive material metallically bonded to steel by a proprietary process.

    a. Available Products:

        1) IKG Industries, a Harsco company; Mebac.
        2) W. S. Molnar Company; SlipNOT.

7. Steel Tubing: ASTM A 500, cold-formed steel tubing.
8. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40 and/or 80), unless another weight is indicated or required by structural loads.
9. Slotted Channel Framing: Cold-formed metal channels complying with MFMA-3, 1-5/8 by 1-5/8 inches. Channels made from galvanized steel complying with ASTM A 653/A 653M, structural steel, Grade 33, with G90 coating; 0.079-inch nominal thickness.
10. Cast Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated or required by structural loads.

C. Nonferrous Metals:

1. Aluminum Extrusions: ASTM B 221, alloy 6063-T6.
2. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, alloy 6061-T6.
3. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.3 FASTENERS

A. General: Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.

B. Cast-in-Place Anchors in Concrete: Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

2.4 MISCELLANEOUS MATERIALS

A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI #79.

B. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.

1. Available Products:

a. Benjamin Moore & Co.; Epoxy Zinc-Rich Primer CM18/19.
b. Carboline Company; Carbozinc 621.
c. ICI Devoe Coatings; Catha-Coat 313.
d. International Coatings Limited; Interzinc 315 Epoxy Zinc-Rich Primer.
e. PPG Architectural Finishes, Inc.; Aquapon Zinc-Rich Primer 97-670.
f. Sherwin-Williams Company (The); Corothane I GalvaPac Zinc Primer.
g. Tnemec Company, Inc.; Tneme-Zinc 90-97.

C. Galvanizing Repair Paint: SSPC-Paint 20, high-zinc-dust-content paint for regalvanizing welds in steel.

D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

E. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

2.5 FABRICATION

A. General: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.

1. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
2. Weld corners and seams continuously. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. Obtain fusion without undercut or overlap. Remove welding flux immediately. Finish exposed welds smooth and blended.
3. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.
4. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
5. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, not less than 24 inches o.c.

B. Miscellaneous Framing and Supports: Provide steel framing and supports not specified in other Sections as needed to complete the Work. Fabricate units from steel shapes, plates, and bars of welded construction. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. Fabricate steel girders for wood frame construction from continuous steel shapes. Where wood nailers are attached to girders with bolts or lag screws, drill holes as indicated.
2. Fabricate steel pipe columns for supporting wood frame construction with steel baseplates and top plates welded to pipe with fillet welds the same size as pipe wall thickness.
3. Shelf Angles in Exterior Walls: Galvanize.
4. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

C. Loose Bearing and Leveling Plates: Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts.

D. Miscellaneous Steel Trim: Fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Exterior Miscellaneous Steel Trim: Galvanize. Paint where exposed to view.

E. Metal Bollards: Fabricate from 1/4-inch wall-thickness rectangular steel tubing or as indicated.

1. Cap bollards with 1/4-inch thick steel plate.
2. Fabricate bollards with steel baseplates for bolting to concrete slab as indicated. Drill baseplates for anchors an indicated.
3. Fabricate sleeves for bollard anchorage from steel pipe or tubing with 1/4-inch- thick steel plate welded to bottom of sleeve.
4. Paint bollards after installation

F. Pipe Guards: Fabricate from 3/8-inch- thick by 12-inch- wide steel plate, bent to fit flat against the wall or column at both ends and to fit around pipe with 2-inch clearance between pipe and pipe guard. Drill each end for two 3/4-inch anchor bolts.

G. Bicycle Racks: Fabricate from Schedule 40 steel pipe, fully welded together.

1. Fabricate with NPS 3 top rails and end posts, NPS 1-1/2 bottom rails, and NPS 3/4 vertical separators at approximately 8 inches o.c.
2. Make top rails 36 inches above pavement/floor and bottom rails 4 inches above pavement/floor.
3. Fabricate end posts with 1/4-inch- thick steel baseplates for bolting to concrete slab. Drill end post baseplates at all 4 corners for 1/2-inch anchor bolts.
4. Finish: Galvanized. Painted.

2.6 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Finish metal fabrications after assembly.

B. Steel and Iron Finishes:

1. Hot-dip galvanize items as indicated to comply with ASTM A 123/A 123M or ASTM A 153/A 153M as applicable.
2. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with requirements indicated below for environmental exposure conditions of installed metal fabrications:

    a. Exteriors (SSPC Zone 1B) and Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
    b. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

3. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting," for shop painting.

4. Paint where exposed to view.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, with edges and surfaces level, plumb, and true.

1. Fit exposed connections accurately together. Weld connections that are not to be left as exposed joints but cannot be shop welded. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication.
2. Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.
3. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

B. Set bearing and leveling plates on cleaned surfaces using wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts and pack solidly with nonshrink, nonmetallic grout.

C. Bollards:
1. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete. Fill annular space around bollard solidly with nonshrink, nonmetallic grout.
2. Anchor bollards in place with concrete footings. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

3. Fill bollards solidly with concrete, mounding top surface to shed water.

D. Touch up surfaces and finishes after erection.

1. Painted Surfaces: Clean field welds, bolted connections, and abraded areas and touch up paint with the same material as used for shop painting.
2. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000

SECTION 05 50 00

SITE METAL FABRICATIONS

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. Miscellaneous metal work shown on the landscape architectural drawings as needed for a proper and complete installation.

2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

B. Related Sections:

1. Division 03 Section "Landscape Architectural Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.

2. Division 04 Section "Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.

3. Division 12 Section "Site Furnishings" for bicycle racks.

1.3 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Grout.

B. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

C. Samples for Verification: For each type and finish.

D. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Qualification Data: For qualified professional engineer.

F. Mill Certificates: Signed by manufacturers of stainless-steel certifying that products furnished comply with requirements.

G. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.7 COORDINATION

A. Coordinate installation of anchorages and steel weld plates and angles for casting into concrete. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.8 REFERENCES

A. Comply with requirements of California Building Code, 2016, as amended by City of San Diego jurisdictional code authorities.

B. AAMA, American Architectural Manufacturers Association, current edition of standard specified.

C. ANSI, American National Standards Institute, current edition of standard specified.

D. ASTM A53/A53M-02, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

E. ASTM D3359-02, Standard Test Methods for Measuring Adhesion by Tape Test.

F. ASTM D3363-00, Standard Test Method for Film Hardness by Pencil Test.

G. ASTM E488-96(2003), Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements.

H. ASTM F593-02, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

I. ASTM F594-02, Standard Specification for Stainless Steel Nuts.

J. SSPC-SP 1, Solvent Cleaning.

K. SSPC-SP 3, Power Tool Cleaning.

L. SSPC-SP 5, Near White Blast Cleaning.

M. UL (Underwriters Laboratories Inc.)

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

A. Recycled Content of Steel Products: Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Steel Tubing: ASTM A 500, cold-formed steel tubing.

D. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.

2.3 FASTENERS

A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

.

B. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.

1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

C. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).

D. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME B18.21.2M).

E. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

F. Post-Installed Anchors: [Torque-controlled expansion anchors] [or] [chemical anchors].

1. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy [Group 1 (A1)] [Group 2 (A4)] stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

E. Concrete: Comply with requirements in Division 03 Section "Landscape Architectural Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply 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. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

1. Fabricate units from slotted channel framing where indicated.

2. Furnish inserts for units installed after concrete is placed.

C. Fabricate steel pipe columns for from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.

1. Unless otherwise indicated, fabricate from Schedule 40 steel pipe.

2. Unless otherwise indicated, provide 1/2-inch (12.7-mm) baseplates with four 5/8-inch (16-mm) anchor bolts and 1/4-inch (6.4-mm) top plates.

D. Galvanize miscellaneous framing and supports where indicated.

E. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.7 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.8 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.9 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion..

2.10 ANTI GRAFFITI COATING

A. Unless otherwise specified in the drawings or indicated by the landscape architect, all metal fabrications shall receive Anti Graffiti Coating, either manufacturer applied or contractor applied per the manufacturer’s instructions and requirements.

B. Basis-of-Design Product: Subject to compliance with requirements, provide the product by the following manufacturer:

1. Graffiti Solutions System by GSS Coatings, LLC , GSSCC-100 Clear Flat, or GSSCC-200 Pigmented Flat installed by a certified applicator, or approved equal. Refer to manufacturer's recommendations for undercoat requirements based on material being coated. GSS Base coatings GSS-500 Aqualock Water Repellent and GSS-307 Base Coat as determined by Architect and GSS Coatings recommendations.

    a. GSS Coatings LLC, 801-255-9505, contact Gordon Daw gordon@gsscoatings.com

    b. If proposed equal is not pre-approved thirty (30) days prior to bid, then it will not be considered or accepted under any circumstances.

C. System Performance: Provide anti-graffiti coating system complying with the following:

1. Permanent coating system. Coatings shall not require re application regardless of number of graffiti taggings during the life of the 10 year performance warranty period.

2. Show no signs of deterioration or change of appearance after graffiti removal during the warranty period. No ghosting staining or shadowing.

3. Capability of removing 100% of all types of paint and graffiti materials from treated surfaces without damaging the coating or the substrate.

4. Upon graffiti removal, no evidence of graffiti shall remain.

5. Capable of withstanding a minimum of 120 cleaning cycles over the same area without measurable coating deterioration.

6. Shall not increase dirt pick-up of substrate.

7. Meet the following test results for the following chemicals:

    a. MEK No effect after 5 days
    b. Carboxylic Acid No effect after 5 days
    c. 75% Phosphoric Acid No effect after 5 days
    d. 37% HCL 3 hours blister
    e. 50% Sulfuric Acid No effect after 5 days
    f. 20% NIT 68 hours blister g.
    g. Finish Sheen <5° on Gardner Gloss Meter
    h. ASTM B 117 and ASTM D 714 (salt spray minimum acceptable of 8000 hours.
    i. ASTM D 530 (hardness)
    j. ASTM D 412 (tensile strength and elongation)
    k. ASTM D 522 (pass 3/8 inch mandral)
    l. ASTM 968 (abrasion test)
    m. ASTM E 96 (vapor transmission)
    n. Water clear, non-yellowing, free of waxes and urethanes.
    o. Shall allow moisture vapor transmission

D. Application: Per manufacture recommendations.

E. Mock-up area to be completed and approved prior to application to remaining substrate.

F. VOC Classification: Provide materials that comply with the South Coast Air Quality Management District's VOC classification.

G. Graffiti Remover: GSS-400 Erasol®; Non-flammable, biodegradable, with a pH 7 - 8.5 and recyclable, allowing graffiti removal without the use of blasting equipment, hot water, or high pressure wash equipment. Furnish GSS-400 Erasol® graffiti removal materials in quantities described below.

1. Quantity: One full case (12, 16 ounce bottles).

H. Warranty: 10 Year System Performance Warranty: Provide written warranty signed by manufacturer that exhibits defects in materials or workmanship. Defects are defined to include failure to withstand complete graffiti removal, ghosting, shadowing, chemical staining, yellowing, and normal environmental effects. Refer to GSS Coatings, LLC 10 Year Warranty. To obtain warranty service the purchaser must contact GSS Coatings, LLC in writing.

1. Warranty process to per GSS Coatings Warranty Procedures to include testing of treated substrates via Skype or FACETIME with GSS Coatings, LLC
2. Warranty period: 10 years from date of completion.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

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. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

3.3 ANTI GRAFFITI COATING

A. Apply the water repellant and anti-graffiti undercoating(s) and finish coating(s) per the manufacturer's written instructions. An airless sprayer shall be used for all surfaces and applications, unless otherwise recommended by the manufacturer. Test a small area before applying to the entire surface.

3.4 ADJUSTING AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05 50 00

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Steel pipe and tube railings.

B. See Division 05 Section "Metal Stairs" for steel tube railings associated with metal stairs.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

   1. Handrails:

      a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
      b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
      c. Uniform and concentrated loads need not be assumed to act concurrently.

   2. Top Rails of Guards:

      a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
      b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
      c. Uniform and concentrated loads need not be assumed to act concurrently.

   3. Infill of Guards:

      a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
      b. Infill load and other loads need not be assumed to act concurrently.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.3 SUBMITTALS

A. Product Data: For mechanically connected railings, grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

   1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples: For each exposed finish required.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

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. Steel Pipe and Tube Railings:

a. Pisor Industries, Inc.
b. Sharpe Products.
c. Wagner, R & B, Inc.; a division of the Wagner Companies.

2.2 METALS

A. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

B. Steel and Iron:

1. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
2. Tubing: ASTM A 500 (cold formed) Pipe: ASTM A 53/A 53M, Grade B, Standard Weight (Schedule 40 and 80) as indicated, unless another grade and weight are required by structural loads.
3. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.3 MISCELLANEOUS MATERIALS

A. Fasteners: Provide concealed fasteners, unless unavoidable or standard for railings indicated.

1. Steel Railings: Plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.

B. Anchors: Provide cast-in-place, chemical, or torque-controlled expansion anchors as indicated, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488.

C. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

D. Shop Primers: Provide primers that comply with Division 09 painting Sections.

E. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.

F. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.

G. Shop Primer for Galvanized Steel: Zinc-dust, zinc-oxide primer compatible with finish paint systems indicated, and complying with SSPC-Paint 5.

H. Grout and Anchoring Cement: Factory-packaged, nonshrink, nonmetallic grout complying with ASTM C 1107; or water-resistant, nonshrink anchoring cement; recommended by manufacturer for exterior use.

2.4 FABRICATION

A. General: Fabricate railings to comply with design, dimensions, and details indicated.

B. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

C. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings.

D. Form changes in direction by bending or by inserting prefabricated elbow fittings.

E. Form curves by bending in jigs to produce uniform curvature; maintain cross section of member throughout bend without cracking or otherwise deforming exposed surfaces.

F. Close exposed ends of railing members with prefabricated end fittings.

G. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated.

H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work, unless otherwise indicated.

2.5 FINISHES

A. Steel and Iron:

1. Galvanized Railings: Hot-dip galvanize indicated railings, after fabrication, to comply with ASTM A 123/A 123M. Provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
2. Shop-Primed Galvanized Railings: After galvanizing, clean railings, treat with metallic-phosphate process, and apply primer to comply with SSPC-PA 1.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation.

1. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
2. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).

B. Anchor posts in concrete by inserting into preset steel pipe sleeves and grouting annular space.

C. Anchor posts to metal surfaces with oval flanges.

D. Anchor railing ends to concrete and masonry with round flanges connected to railing ends and anchored to wall construction with anchors and bolts.

E. Attach handrails to wall with wall brackets.

1. Use type of bracket as indicated.
2. For CMU walls use drilled anchors.

F. Adjusting and Cleaning:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting.
2. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055213

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Framing with dimension lumber.
2. Framing with engineered wood products.
3. Wood blocking, cants, and nailers.
4. Wood furring and grounds.
5. Plywood backing panels.

1.2 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

1. Include data for wood-preservative and fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee Board of Review.

C. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Engineered wood products.
4. Power-driven fasteners.
5. Powder-actuated fasteners.
6. Expansion anchors.
7. Metal framing anchors.

1.3 QUALITY ASSURANCE

A. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship":

1. Dimension lumber framing.
2. Laminated-veneer lumber.
3. Rim boards.

4. Miscellaneous lumber.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Provide dressed lumber, S4S, unless otherwise indicated.

B. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA C2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).

1. Preservative Chemicals: Acceptable to authorities having jurisdiction.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.

4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood).

1. Use Exterior type for exterior locations and where indicated.
2. Use Interior Type A, High Temperature (HT) for enclosed roof framing, framing in attic spaces, and where indicated.
3. Use Interior Type A, unless otherwise indicated.

B. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

C. Application: Treat items indicated on Drawings, and the following:

1. Framing for raised platforms.
2. Concealed blocking.
3. Framing for non-load-bearing partitions.
4. Framing for non-load-bearing exterior walls.
5. Roof construction.
6. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

A. Maximum Moisture Content: 19 percent.

B. Non-Load-Bearing Interior Partitions: Standard or Stud grade of Douglas Fir-Larch species.

C. Framing Other Than Non-Load-Bearing Interior Partitions: No. 1 grade and of the following species:
1. Douglas fir-larch; WCLIB or WWPA.

D. Framing Other Than Non-Load-Bearing Interior Partitions: Douglas Fir-Larch species and grade with a modulus of elasticity of at least 1,700,000 psi and an extreme fiber stress in bending of at least 1000 psi (6.9 MPa) for 2-inch nominal (38-mm actual) thickness and 12-inch nominal (286-mm actual) width for single-member use.

E. Exposed Exterior or Interior Framing Indicated to Receive a Stained or Natural Finish: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.

1. Species and Grade: As indicated above for load-bearing construction of same type.

2.5 ENGINEERED WOOD PRODUCTS

A. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559 and containing no urea formaldehyde.

1. Extreme Fiber Stress in Bending, Edgewise: 2900 psi (20.0 MPa).
2. Modulus of Elasticity, Edgewise: 2,000,000 psi (13 700 MPa)

2.6 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Cants.
4. Furring.
5. Grounds.

B. For items of dimension lumber size, provide Standard or Stud grade lumber with 19 percent maximum moisture content of any species.

C. For concealed boards, provide lumber with 19 percent maximum moisture content and the following species and grades:

2.7 Species and Grade: As indicated above for load-bearing construction of same type

2.8 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated as indicated, in thickness indicated or, if not indicated, not less than 1/2-inch (13-mm) nominal thickness.

2.9 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners Type 304 stainless steel.

B. Power-Driven Fasteners: NES NER-272.

C. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

2.10 METAL FRAMING ANCHORS

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:

C. Basis-of-Design Products: Subject to compliance with requirements, provide products indicated on Drawings.

D. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer that meet or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

E. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.

F. Paint all framing anchors after installation and nailing.

2.11 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch (25-mm) nominal thickness, compressible to 1/32 inch (0.8 mm); selected from manufacturer's standard widths to suit width of sill members indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

D. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.

E. Carefully mask wood adjacent to framing anchors. Prime and paint all exposed surfaces.

F. Do not splice structural members between supports, unless otherwise indicated.

G. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

H. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's Uniform Building Code.
4. Table 2305.2, "Fastening Schedule," in BOCA's BOCA National Building Code.
5. Table 2306.1, "Fastening Schedule," in SBCCI's Standard Building Code.
6. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
7. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's International One- and Two-Family Dwelling Code.

3.2 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Framing with dimension lumber.
2. Wood blocking, cants, and nailers.
3. Wood furring and grounds.
4. Wood sleepers.
5. Interior wood trim.
6. Plywood backing panels.

1.2 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

1. Include data for wood-preservative and fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.

1.3 QUALITY ASSURANCE

A. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship":

1. Dimension lumber framing.
2. Miscellaneous lumber.
3. Interior wood trim.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Provide dressed lumber, S4S, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA C2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawl spaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood).

1. Use Exterior type for exterior locations and where indicated.

2. Use Interior Type A, High Temperature (HT) for enclosed roof framing, framing in attic spaces, and where indicated.
3. Use Interior Type A, unless otherwise indicated.

B. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

C. Application: Treat items indicated on Drawings, and the following:

1. Framing for raised platforms.
2. Concealed blocking.
3. Roof construction.
4. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

A. Maximum Moisture Content: 19 percent.

B. Non-Load-Bearing Interior Partitions: Construction or Stud grade of Douglas Fir-Larch species.

C. Other Framing: No. 1 of the following species:
1. Douglas fir-larch; WCLIB or WWPA.

2.5 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.
7. Utility shelving.

B. For items of dimension lumber size, provide No. 1 grade lumber with 19 percent maximum moisture content of Douglas Fir-Larch species.

2.6 INTERIOR WOOD TRIM

A. General: Provide kiln-dried finished (surfaced) material without finger-jointing, unless otherwise indicated.

B. Hardwood Lumber Trim for Transparent (Stain or Clear) Finish: as indicated.

C. Lumber Trim for Opaque (Painted) Finish: Either finger-jointed or solid lumber, of one of the following species and grades:

1. Grade Premium eastern white pine; NeLMA or NLGA.

D. Moldings: Made to patterns included in WMMPA WM 7 and graded according to WMMPA WM 4.

1. Moldings for Transparent (Stain or Clear) Finish: N-grade red oak.
2. Moldings for Opaque (Painted) Finish: P-grade eastern white, Idaho white, lodgepole, ponderosa, or sugar pine.
3. Wood boards of same species and grade indicated above for interior lumber trim for opaque or transparent finish.

E. Shelf Cleats: 3/4-by-5-1/2-inch (19-by-140-mm) boards with hole and notch to receive clothes rods, of same species and grade indicated above for interior lumber trim for opaque finish.

F. Clothes Rods: 1-1/2-inch- (38-mm-) diameter, aluminum tubes.

2.7 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged fire-retardant treated in thickness indicated or, if not indicated, not less than 1/2-inch (13-mm) nominal thickness unless indicated otherwise.

2.8 FASTENERS

A. General: Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.

B. Power-Driven Fasteners: NES NER-272.

C. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Do not splice structural members between supports, unless otherwise indicated.

D. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

E. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's Uniform Building Code.
4. Table 2305.2, "Fastening Schedule," in BOCA's BOCA National Building Code.
5. Table 2306.1, "Fastening Schedule," in SBCCI's Standard Building Code.
6. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
7. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's International One- and Two-Family Dwelling Code.

F. Wood Trim Installation: Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Cope at returns and miter at corners to produce tight-fitting joints with full-surface

1. Match color and grain pattern across joints. contact throughout length of joint. Use scarf joints for end-to-end joints.
2. Install trim after gypsum board joint-finishing operations are completed.
3. Install to tolerance of 1/8 inch in 96 inches (3 mm in 2438 mm) for level and plumb. Install adjoining finish carpentry with 1/32-inch (0.8-mm) maximum offset for flush installation and 1/16-inch (1.6-mm) maximum offset for reveal installation.

3.2 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061053

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Wall sheathing.
2. Roof sheathing.
3. Composite nail base insulated roof sheathing.
4. Underlayment.
5. Building paper.
6. Building wrap.
7. Sheathing joint-and-penetration treatment.
8. Flexible flashing at openings in sheathing.

1.2 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment and fire-retardant treatment as indicated from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements.

B. Research/Evaluation Reports: For the following:

1. Preservative-treated plywood.
2. Fire-retardant-treated plywood.
3. Foam-plastic sheathing.
4. Building wrap.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

B. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship":

1. Plywood.
2. Oriented strand board.
3. Particleboard underlayment.

4. Hardboard underlayment.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS, GENERAL

A. Plywood: As indicated.

2.2 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA C9.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.3 FIRE-RETARDANT-TREATED PLYWOOD

A. General: Comply with performance requirements in AWPA C27.

1. Use Exterior type for exterior locations and where indicated.
2. Use Interior Type A, High Temperature (HT) for roof sheathing and where indicated.
3. Use Interior Type A, unless otherwise indicated.

B. Kiln-dry material after treatment to a maximum moisture content of 15 percent.

C. Identify fire-retardant-treated plywood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

D. Application: Treat all plywood, unless otherwise indicated.

2.4 WALL SHEATHING

A. Plywood Wall Sheathing: Exposure 1, Structural I sheathing.

2.5 ROOF SHEATHING

A. Plywood Roof Sheathing: Exposure 1, Structural I sheathing.

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated.

1. For wall and roof sheathing panels, provide fasteners with corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

2.7 WEATHER-RESISTANT SHEATHING PAPER

A. Building Paper: ASTM D 226, Type 1 (No. 15 asphalt-saturated organic felt), unperforated.

2.8 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 that is approved for use indicated by manufacturers of both adhesives and panels.

1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Flexible Flashing: Self-adhesive, rubberized-asphalt compound, bonded to a high-density, polyethylene film to produce an overall thickness of not less than 0.025 inch (0.6 mm).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Securely attach to substrate by fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's "Uniform Building Code."
4. Table 2305.2, "Fastening Schedule," in BOCA's "BOCA National Building Code."
5. Table 2306.1, "Fastening Schedule," in SBCCI's "Standard Building Code."
6. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."
7. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's "International One- and Two-Family Dwelling Code."

B. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that exclude exterior moisture.

C. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial."

1. Comply with "Code Plus" installation provisions in guide referenced in paragraph above.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall and Roof Sheathing:

a. Nail to wood framing as indicated. Apply a continuous bead of glue to framing members at edges of floor sheathing panels.

3.3 WEATHER-RESISTANT SHEATHING-PAPER INSTALLATION

A. General: Cover sheathing with weather-resistant sheathing paper as follows:

1. Cut back barrier 1/2 inch (13 mm) on each side of the break in supporting members at expansion- or control-joint locations.
2. Apply barrier to cover vertical flashing with a minimum 4-inch (100-mm) overlap, unless otherwise indicated.

B. Building Paper: Apply horizontally with a 2-inch (50-mm) overlap and a 6-inch (150-mm) end lap; fasten to sheathing with galvanized staples or roofing nails.

C. Building Wrap: Comply with manufacturer's written instructions.

1. Seal seams, edges, fasteners, and penetrations with tape.
2. Extend into jambs of openings and seal corners with tape.

3.4 SHEATHING JOINT-AND-PENETRATION TREATMENT

A. Seal sheathing joints according to sheathing manufacturer's written instructions.

1. Apply elastomeric sealant to joints and fasteners and trowel flat. Seal other penetrations and openings.
2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing board joints, and apply and trowel silicone emulsion sealant to embed tape in sealant. Apply sealant to exposed fasteners. Seal other penetrations and openings.
3. Apply sheathing tape to joints between foam-plastic sheathing panels and at items penetrating sheathing. Apply at upstanding flashing to overlap both flashing and sheathing.

3.5 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturers written instructions.

1. Lap seams and junctures with other materials at least 4 inches (100 mm), except that at flashing flanges of other construction, laps need not exceed flange width.
2. Lap flashing over weather-resistant building paper at bottom and sides of openings.
3. Lap weather-resistant building paper over flashing at heads of openings.
4. After flashing has been applied, roll surfaces with a hard rubber or metal roller.

3.6 PROTECTION

A. Paper-Surfaced Gypsum Sheathing: Protect sheathing by covering exposed exterior surface of sheathing with weather-resistant sheathing paper securely fastened to framing. Apply covering immediately after sheathing is installed.

END OF SECTION 061600

SECTION 061800 - GLUED-LAMINATED CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes framing using structural glued-laminated timber.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Certificates of Conformance: Issued by a qualified testing and inspecting agency indicating that structural glued-laminated timber complies with requirements in AITC A190.1.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide factory-glued structural units produced by an AITC- or APA-licensed firm that is certified for chain of custody by an FSC-accredited certification body.

1. Factory mark each piece of structural glued-laminated timber with AITC Quality Mark or APA-EWS trademark. Place mark on surfaces that will not be exposed in the completed Work.

B. Quality Standard: Comply with AITC A190.1.

C. Forest Certification: Provide structural glued-laminated timber produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

1.4 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with provisions in AITC 111.

B. Individually wrap members using plastic-coated paper covering with water-resistant seams.

PART 2 - PRODUCTS

2.1 STRUCTURAL GLUED-LAMINATED TIMBER

A. General: Provide structural glued-laminated timber that complies with AITC 117 or research/evaluation reports acceptable to authorities having jurisdiction.

1. Provide structural glued-laminated timber made from solid lumber laminations; do not use laminated veneer lumber.
2. Provide structural glued-laminated timber made with wet-use adhesive complying with ASTM D 2559.

    a. Use adhesive that contains no urea-formaldehyde resins.

B. Species and Grades for Structural Glued-Laminated Timber: Any species that complies with structural properties indicated.

C. Species and Grades for Beams and Purlins:

1. Species and Beam Stress Classification: Douglas fir-larch, 24F-1.8E stress classification.
2. Lay-up: Either balanced or unbalanced.

D. Appearance Grade: Architectural, complying with AITC 110.

E. End Sealer: Manufacturer's standard, transparent, colorless wood sealer that is effective in retarding the transmission of moisture at cross-grain cuts and is compatible with indicated finish.

F. Penetrating Sealer: Manufacturer's standard, transparent, penetrating wood sealer that is compatible with indicated finish.

2.2 TIMBER CONNECTORS

A. General: Unless otherwise indicated, fabricate from the following materials:

1. Structural-steel shapes, plates, and flat bars complying with ASTM A 36/A 36M.
2. Round steel bars complying with ASTM A 575, Grade M 1020.
3. Hot-rolled steel sheet complying with ASTM A 1011/A 1011M, Structural Steel, Type SS, Grade 33.

B. Finish steel assemblies and fasteners with rust-inhibitive primer, 2-mil (0.05-mm) dry film thickness.

C. Hot-dip galvanize steel assemblies and fasteners after fabrication to comply with ASTM A 123/A 123M or ASTM A 153/A 153M.

2.3 FABRICATION

A. Shop fabricate for connections to greatest extent possible, including cutting to length and drilling bolt holes.

B. Camber: Fabricate horizontal and inclined members of less than 1:1 slope with either circular or parabolic camber equal to 1/500 of span.

C. End-Cut Sealing: Immediately after end cutting each member to final length, apply a saturation coat of end sealer to ends and other cross-cut surfaces, keeping surfaces flood coated for not less than 10 minutes.

D. Seal Coat: After fabricating, sanding, and end-coat sealing, apply a heavy saturation coat of penetrating sealer on surfaces of each unit.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Erect structural glued-laminated timber true and plumb, and with uniform, close-fitting joints. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.

1. Lift with padded slings and protect corners with wood blocking.

B. Fit structural glued-laminated timber by cutting and restoring exposed surfaces to match specified surfacing.

1. Predrill for fasteners using timber connectors as templates.
2. Dress exposed surfaces to remove planing or surfacing marks and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.
3. Coat cross cuts with end sealer.

C. Cutting: Avoid cutting after fabrication. Where field fitting is unavoidable, comply with requirements for shop fabrication.

D. Repair damaged surfaces after completing erection. Replace damaged structural glued-laminated timber if repairs are not approved by Architect.

E. Do not remove wrappings on individually wrapped members until they no longer serve a useful purpose including protection from weather, sunlight, soiling, and damage from work of other trades.

END OF SECTION 061800

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Plastic-laminate cabinets.
2. Plastic-laminate countertops.
3. Solid-surfacing-material countertops.
4. Shop finishing of woodwork.

B. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips unless concealed within other construction before woodwork installation.

1.2 SUBMITTALS

A. Product Data: For solid-surfacing material, cabinet hardware and accessories and finishing materials and processes.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

C. Samples:

1. Plastic-laminates, for each type, color, pattern, and surface finish.
2. Thermoset decorative panels, for each type, color, pattern, and surface finish.
3. Solid-surfacing materials.

D. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of woodwork.

B. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards."

1. Provide AWI Quality Certification Program labels for woodwork, including installation.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 WOODWORK FABRICATORS

A. Fabricators: Subject to compliance with requirements, provide interior architectural woodwork by one of the following:

2.2 MATERIALS

A. Wood Products:

1. Recycled Content of Medium-Density Fiberboard and Particleboard: Provide products with an average recycled content so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
2. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.
3. Particleboard: ANSI A208.1, Grade M-2.
4. Softwood Plywood: DOC PS 1, Medium Density Overlay.

B. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

C. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.

1. Manufacturers: Basis of design product as indicated on drawings. Subject to compliance with requirements, manufacturers offering products matching the color indicated that may be incorporated into the Work include, but are not limited to, the following:

a. ABA Industries.
b. Avonite, Inc.
c. E. I. du Pont de Nemours and Company.
d. Formica Corporation.
e. LG Chemical, Ltd.
f. Meganite Inc.; a division of the Pyrochem Group.
g. Nevamar Company, LLC; Decorative Products Div.
h. Samsung; Cheil Industries Inc.
i. Swan Corporation (The).
j. Transolid, Inc.
k. Wilsonart International; Div. of Premark International, Inc.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Comply with performance requirements of AWPA C20 (lumber) and AWPA C27 (plywood). Use Exterior Type or Interior Type A. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Kiln-dry material after treatment.

B. Fire-Retardant Particleboard: Panels made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture with flame-spread index of 25 or less and smoke-developed index of 25 or less per ASTM E 84.

C. Fire-Retardant Fiberboard: ANSI A208.2 medium-density fiberboard panels made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture with flame-spread index of 25 or less and smoke-developed index of 200 or less per ASTM E 84.

2.4 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural woodwork, except for items specified in Division 08 Section "Door Hardware".

B. Butt Hinges: 2-3/4-inch (70-mm), 5-knuckle steel hinges made from 0.095-inch- (2.4-mm-) thick metal, and as follows:

1. Semiconcealed Hinges for Flush Doors: BHMA A156.9, B01361.
2. Semiconcealed Hinges for Overlay Doors: BHMA A156.9, B01521.

C. Wire Pulls: Provide U-shaped pulls at all accessible casework (CBC 1125B.4), back mounted, solid metal, 4 inches (100 mm) long, 5/16 inch (8 mm) in diameter.

D. Catches: Magnetic catches, BHMA A156.9, B03141.

E. Drawer Slides: BHMA A156.9, B05091.

1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.
2. Box Drawer Slides: Grade 1; for drawers not more than 6 inches (150 mm) high and 24 inches (600 mm) wide.
3. File Drawer Slides: Grade 1HD-100; for drawers more than 6 inches (150 mm) high or 24 inches (600 mm) wide.
4. Pencil Drawer Slides: Grade 2; for drawers not more than 3 inches (75 mm) high and 24 inches (600 mm) wide.

F. Aluminum Slides for Sliding Glass Doors: BHMA A156.9, B07063.

G. Door Locks: BHMA A156.11, E07121. Best large format core to match City standards.

H. Drawer Locks: BHMA A156.11, E07041. Best large format core to match City standards.

I. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Stainless Steel: BHMA 630.

2.5 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

B. Handrail Brackets: Cast from malleable iron with wall flange drilled and tapped for concealed hanger bolt and with support arm for screwing to underside of rail. Sized to provide 1-1/2-inch (38-mm) clearance between handrail and wall.

C. Adhesives, General: Do not use adhesives that contain urea formaldehyde.

2.6 FABRICATION

A. General: Complete fabrication to maximum extent possible before shipment to Project site. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.

1. Interior Woodwork Grade: Custom.
2. Shop cut openings to maximum extent possible. Sand edges of cutouts to remove splinters and burrs. Seal edges of openings in countertops with a coat of varnish.

B. Plastic-Laminate Cabinets:

1. AWI Type of Cabinet Construction: Flush overlay.
2. Reveal Dimension: 1/2 inch (13 mm).
3. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate as follows:

    a. Horizontal Surfaces Other Than Tops: Grade HGS.
    b. Postformed Surfaces: Grade HGP.
    c. Vertical Surfaces: Grade HGS.
    d. Edges: PVC T-mold matching laminate in color, pattern, and finish.

4. Materials for Semiexposed Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS.
5. **Drawer Sides and Backs: Solid-hardwood lumber.**
6. Drawer Bottoms: Hardwood plywood.
7. Colors, Patterns, and Finishes: As selected by Architect from laminate manufacturer's full range of patterns, matte finish.
8. Provide dust panels of 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

C. Plastic-Laminate Countertops:

1. High-Pressure Decorative Laminate Grade: HGS.

2. Colors, Patterns, and Finishes: As selected by Architect from laminate manufacturer's full range of patterns, matte finish.
3. Edge Treatment: Hardwood or phenolic 1-1/2" bullnose.
4. Core Material at Sinks: Exterior-grade plywood.

D. Solid-Surfacing-Material Countertops:

1. Solid-Surfacing-Material Thickness: 1/2 inch (13 mm).
2. Colors, Patterns, and Finishes: As indicated.
3. Fabricate tops in one piece with loose backsplashes for field application. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
4. Install integral sink bowls in countertops in shop.
5. Edge treatment: Bullnose.

E. Finish architectural woodwork at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.

F. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas. Examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

B. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

C. Install woodwork level, plumb, true, and straight to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm). Shim as required with concealed shims.

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.

1. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches (400 mm) o.c. with No. 10 wafer-head screws sized for 1-inch (25-mm) penetration into wood framing, blocking, or hanging strips.

G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."

END OF SECTION 064023

SECTION 071900 - WATER REPELLENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes penetrating water-repellent coatings for the following vertical and horizontal surfaces:

1. Concrete (unpainted).
2. Concrete floors.
3. Concrete unit masonry (unpainted and unglazed).

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product test reports.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer and Applicator agree(s) to repair or replace materials that fail to maintain water repellency specified in Part 1 "Performance Requirements" Article within Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 PENETRATING WATER REPELLENTS

A. Silane, Penetrating Water Repellent: Clear, monomeric compound containing 20 percent or more solids of alkyltrialkoxysilanes; with alcohol, mineral spirits, water, or other proprietary solvent carrier; and with 3.3 lb/gal. or less of VOCs.

1. Available Products:

a. Advanced Chemical Technologies, Inc.; Dri-Treat orSil-Act Multiguard.
b. Anti-Hydro International, Inc.; Aridox 40M.
c. ChemMasters; Aquanil Plus 40.
d. Gemite Products, Inc.; Gem Guard SL.
e. Hydrozo, a division of ChemRex; Enviroseal 20.
f. Pecora Corporation; Klear-Seal 9100 S.
g. Seal-Krete, Inc.; S-K High Solids.
h. Sonneborn Building Products, a division of ChemRex; White Rox 10 VOC.
i. Tamms Industries, Inc.; Baracade Silane 100.

2.3 FILM-FORMING WATER REPELLENTS

A. Silicone Sealer, Film-Forming Water Repellent: Clear, polymerized, silicone-resin water repellent for dense substrates; with a solvent- or water-based solution containing not less than 3 and up to 5 percent solids by weight; and with 3.3 lb/gal. or less of VOCs.

1. Available Products:

a. ChemMasters; Aquanil HS Silicone.
b. Euclid Chemical Company (The); Silicone Waterpeller W.
c. Wacker Chemical Corp.; 17711.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrate of substances that might interfere with penetration or performance of water repellents. Test for moisture content, according to water-repellent manufacturer's written instructions, to ensure that surface is dry enough.

1. Cast-in-Place Concrete: Remove oil, curing compounds, laitance, and other substances that could prevent adhesion or penetration of water repellents.
2. Clay Brick Masonry: Clean clay brick masonry per ASTM D 5703.

B. Test for pH level, according to water-repellent manufacturer's written instructions, to ensure chemical bond to silicate minerals.

C. Protect adjoining work, including sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Cover live plants and grass.

D. Coordination with Sealants: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.

1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those used in the work.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATION

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of water repellent and to instruct Applicator on the product and application method to be used.

B. Apply a heavy-saturation spray coating of water repellent on surfaces indicated for treatment using low-pressure spray equipment. Comply with manufacturer's written instructions for using airless spraying procedure, unless otherwise indicated.

C. Apply a second saturation spray coating, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

3.3 CLEANING

A. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Repair damage caused by water-repellent application. Comply with manufacturer's written cleaning instructions.

END OF SECTION 071900

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Concealed building insulation.
   2. Exposed building insulation.
   3. Vapor retarders.
   4. Sound attenuation insulation.

1.2 PERFORMANCE REQUIREMENTS

A. Plenum Rating: Provide glass fiber insulation where indicated in ceiling plenums whose test performance is rated as follows for use in plenums as determined by testing identical products per "Erosion Test" and "Mold Growth and Humidity Test" described in UL 181, or on comparable tests from another standard acceptable to authorities having jurisdiction.

   1. Erosion Test Results: Insulation shows no visible evidence of cracking, flaking, peeling, or delamination of interior surface of duct assembly, after testing for 4 hours at 2500-fpm air velocity.
   2. Mold Growth and Humidity Test Results: Insulation shows no evidence of mold growth, delamination, or other deterioration due to the effects of high humidity, after inoculation with Chaetomium globosium on all surfaces and storing for 60 days at 100 percent relative humidity in the dark.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: Full-size units for each type of exposed insulation indicated.

C. Product test reports.

D. Research/Evaluation Reports: For foam-plastic insulation.

1.4 QUALITY ASSURANCE

A. Retain ASTM test method below based on product and kind of fire-resistance characteristic specified for each product in Part 2. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84 for surface-burning characteristics and other methods indicated with product, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.
3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CertainTeed Corporation.
2. Guardian Building Products, Inc.
3. Johns Manville.
4. Knauf Insulation.
5. Owens Corning.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

C. Kraft-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type II (non-reflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier).

D. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:
1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.
3.

2.3 AUXILIARY INSULATING MATERIALS

A. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by insulation manufacturers for sealing joints and penetrations in vapor-retarder facings.

B. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

2.4 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Angle formed from perforated galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square, welded to projecting copper-coated steel spindle 0.105 inch in diameter and of length capable of holding insulation of thickness indicated securely in position with 1-1/2-inch- square or diameter self-locking washers complying with the following requirements:

1. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick galvanized steel sheet, with beveled edge for increased stiffness.
2. Where anchors are located in roof framing, protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap.

B. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.

C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

E. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.2 INSTALLATION OF GENERAL BUILDING INSULATION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Seal joints between foam-plastic insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Set vapor-retarder-faced units with vapor retarder **to** warm-in-winter side of construction, unless otherwise indicated.

3.3 INSTALLATION OF VAPOR RETARDERS

A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

B. Seal vertical joints in vapor retarders over framing by lapping not less than two wall studs. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.

C. Before installing vapor retarder, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.

D. Firmly attach vapor retarders to metal framing and solid substrates with vapor-retarder fasteners as recommended by vapor-retarder manufacturer.

E. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.

F. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

END OF SECTION 072100

SECTION 076100 - SHEET METAL ROOFING

PART 1 GENERAL

1.1 SUMMARY

A. SECTION INCLUDES

1. Standing-seam metal roof panels, including trim and accessories

2. RELATED SECTIONS

a) Section 07 22 00 - Roof and Deck Insulation

b) Section 07 62 00 - Sheet Metal Flashing and Trim

c) Section 07 72 00 - Roof Accessories

d) Section 07 92 00 - Joint Sealants

1.2 PERFORMANCE REQUIREMENTS

A. Solar Reflectance Index: Not less than 78.

1.3 QUALITY ASSURANCE

A. Equipment Standard: UL-certified, portable roll-forming equipment for UL 580, Class 30 winduplift resistance.

B. Sheet Metal Roofing Standard: SMACNA's "Architectural Sheet Metal Manual".

C. Provide Mockup of typical roof area and eave.

1.4 WARRANTY

A. Installer's Materials and Workmanship: Two years in base bid. Provide five year warranty as a bid alternate. See 012300 – Alternates.

B. Siliconized Polyester Finishes: 10 years.

C. Fluoropolymer Finishes: 20 years.

1.5 MATERIALS

A. Roofing Sheet Metals:

1. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet with smooth, flat surface.

a. Factory finish: Color to match the patina appearance of the nearby Visitor Centers.

a. Select Seam 16 gauge, 2" high Standing metal seam. Basis of design product: Tremco, "TremLock T-138".

b. B. Underlayment: Felt sheet.

1.2 REFERENCES

A. AISI S-100 – North American Specification for the Design of Cold-Formed Steel Structural Members.

B. ASCE-7: American Society of Civil Engineers -Minimum Design Loads for Buildings and Other Structures; version adopted by local Building Code authority having jurisdiction.

C. ASTM A792 - Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the HotDip Process.

D. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding System by Uniform Static Air Pressure Difference

E. ASTM E1646 - Standard Test Method for Rate of Water Penetration Through Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.

F. ASTM E1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.

G. ASTM E2140 - Standard Test method for water penetration of metal roof panel systems by static water pressure head.

H. Factory Mutual 4471 Appendix G - Susceptibility to Leakage Test Procedure for Class 1 Panel Roofs.

I. UL 580 - Tests for Uplift Resistance of Roof Assemblies.

J. UL 1897 - Uplift Tests for Roof Covering Systems.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meetings:

1. Schedule meeting to discuss roof project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements before start of work onsite.

2. Required attendees: Contractor, deck & roof installer, and any other subcontractors who have equipment penetrating the roof or Work that requires roof access or traffic.

1.4 SUBMITTALS

A. Product Data: Manufacturer literature indicating product specifications, installation instructions, and standard construction details for specified products.

1. Product Test Reports for Credit SS 7.2: For roof panels, indicating that panels comply with Solar Reflectance Index requirement.

C. Shop Drawings: To be prepared by metal roof system manufacturer. Show installation layout of sheet metal roofing, including plans, elevations, expansion joint locations, and key details. Distinguish between shop-and field assembled work.

1. Submit roof plan showing panel layout, profiles, components, accessories, finish colors, gutters and downspouts as applicable.

a) Indicate layout of roofing panels and roof panel sizes, including custom fabricated roofing panels if indicated, indicate each trim condition.

b) Include details of each condition of installation, including the locations and types of fasteners, sealants and accessories, forming, joining and securing sheet metal roofing including pattern of seams, termination points, fixed points, expansion joints, roof penetrations, edge conditions, special conditions, connections to adjoining work, and details of accessory items. Indicate locations, gauges, shapes, and methods of attachment of all panels, accessories and trim.

c) Indicate products/materials required for construction activities of this section not supplied by manufacturer of products of this section.

d) Indicate locations of field applied sealant.

e) Indicate locations of field worked conditions.

D. Coordination Drawings: Roof plans drawn to scale with coordinated details for penetrations and roof-mounted items.

E. Portable Roll-Forming Equipment Certificate: Issued by UL for equipment manufacturer's portable roll-forming equipment capable of producing panels that comply with UL requirements.

F. Product test reports.

G. Maintenance data.

H. Warranties: Sample of special warranties.

1. Roof Panel Attachment:

a) Roof plan with wind uplift pressure calculations at field, corner and perimeter areas according to version of ASCE-7 referenced by locally-adopted Building Code and the authority having jurisdiction.

b) Roof plan indication roof clip spacing pattern at field, corner, perimeters and where panels are to be fixed from thermal movement.

c) Roof panel attachment plan must be stamped by licensed engineer in State in which project is constructed, certifying roof attachment meets local Building Code requirements for wind uplift. I. Samples:

1. Submit two samples, 12" long, full width panel, showing metal gage, and seam.

2. Two samples each for roof panel clip, bearing plate and clip fastener.

3. Submit color samples for Architect's selection.

4. Submit sample warranties:

a) Manufacturer Finish Warranty

b) Manufacturer Weathertightness Warranty complying with this Specification

c) Installer Warranty J. Certificates:

1. Submit roof panel manufacturer's certification that fasteners, clips, backup plates, closures, roof panels and finishes meet the specification requirements.

2. Submit roof panel manufacturer’s certification that installer meets requirements to install roof system and is qualified to obtain required warranties.

K. Delegated Design Submittals: Submit engineering calculations indicating wind uplift pressure calculations according to local building code for project location with respect to appropriate Importance Factor, Exposure category and Safety Factor. Calculations shall be sealed by a professional engineer licensed to practice structural engineering in the state in which project is located.

L. Test and Evaluation Reports - Certified test results that indicate roof system meets or exceeds design and performance criteria. Testing to include:

1. Static Water Testing Certification: Manufacturers test data, signed and sealed by a registered professional engineer, in accordance with FM4471 Appendix G, and pass with no leakage. The test specimen must successfully withstand being submerged under 6” of water for a minimum period of 7 days.

2. ASTM E1680 - Manufacturer’s test data, signed and sealed by a registered professional engineer, for air infiltration rates meeting the following:

a) 16” panel width - 0.0019 cfm/sf maximum at a differential pressure of +/-20 pounds per square foot.

3. ASTME1646 - Manufacturer's test data, signed and sealed by a registered professional engineer, indicating no water penetration up to 20 pounds per square foot differential pressure.

4. ASTM E1592 - Manufacturers test data, signed and sealed by a registered professional engineer, substantiating that roof system will meet the allowable wind pressures using an appropriate Factor of Safety in accordance with AISI S-100.

5. ASTM E2140 - Manufacturers test data, signed and sealed by a registered professional engineer, on a test specimen with no end lap, indicating that no water leakage was observed during the testing period of 6 hours with a 6" water head on the specimen. M. Qualification Statements: For Manufacturer and Installer.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Manual indicating requirements and recommendations, to maintain the roof system, in good working condition.

B. Warranty Documentation: Submit final warranties required in this section.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Manufacturer shall have experience in the manufacturing of metal roof systems similar to those required for this project. Manufacturer must have a current installer training program.

2. Installer Qualifications: Installer ("roofer") to perform the work of this section, shall be qualified by the roof panel manufacturer for installation of manufacturer warranted systems.

B. Field Measurements: Prior to fabrication of panels, take field measurements of structure or substrates to receive panel system. Allow for trimming panel units, where final dimensions cannot be established prior to fabrication.

C. Mock-Ups: Install a 30 foot wide, quality control area of metal roofing, for review by the Architect. The Architect shall approve the quality of installation for the roof, prior to installing additional metal panels.

1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements: Deliver panels to jobsite properly packaged to provide protection against transportation damage. Panels too long to ship shall be site formed onto the roof by manufacturer's factory personnel using manufacturer's factory roll forming equipment.

B. Storage and Handling Requirements:

1. Exercise care in unloading, storing and erecting panels to prevent bending, warping, twisting, and surface damage.

2. Store all material and accessories above ground on well skidded platforms. Store under waterproof covering. Provide proper ventilation to panels to prevent condensation buildup between each panel.

3. Remove from site and replace panels which are damaged, or become water-stained during storage and handling.

1.8 WARRANTIES

A. Manufacturer Warranties:

1. Panel Material: Furnish manufacturers 25 year warranty covering the panel against rupture, structural failure, or perforation.

2. Panel Coating: Furnish manufacturer's 40-year warranty panel coating warranty covering cracking, checking, and peeling, and 30 year warranty covering fade and chalk.

3. Metal Roof Weathertightness Warranty:

a) Manufacturer’s Weathertightness Warranty

(1) Warranty term: 20 years commencing on date of substantial completion.

(2) Total manufacturer’s liability: No Repair Limit / sq. ft.

(3) Warranty must cover: Pipe and Wind Speeds up to 75 mph

(a) Pipes must be centered in pan or a pipe curb must be used. Pipe must be flashed with an EPDM dektite.

(b) Manufacturer must supply engineered installation drawings signed and sealed by an engineer registered in the state of California.

B. Installer Warranty: Installer to provide warranty agreeing to repair or replace metal roof panels, trim, or accessories that fails due to poor workmanship or faulty installation.

1. Warranty term: Warranty form in which Installer agrees to repair or replace components of sheet metal roofing that fail in materials or workmanship within 2 years commencing on date of substantial completion.

2. Special Warranty on Finishes: Manufacturer’s standard form in which manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory applied finishes within 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ROOF PANEL SYSTEM

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Basis of Design: Tremlock T-138 by Tremco 3735 Green Road Beachwood, OH 44122 or approved equal substitute.

C. Substitution Limitations

1. Requests for approval must be submitted in writing at least ten (10) days prior to bid date, and are accompanied by all related test reports and design calculations listed in section 1.4 and Design and Performance criteria Section 2.2.

2. Substitute manufactures will be approved by written addendum to all bidders. Voluntary alternates will not be considered. Substitutions will not be permitted after the bid date of this project.

3. Roof panels proposed for substitution shall fully comply with specified requirements in appearance, assembly, and performance.

D. Product Options

1. Factory-formed panel, width of 16 inches. Panels shall be symmetrical in design and shall be mechanically seamed with a field operated electric seaming machine approved by the manufacturer.

2. Minimum seam height 2 3/8 inches. Integral seam, double lock and snap together type panels are not acceptable

3. Seam cap matching panel finish with two rows of integral factory hot applied sealant. Sealant should not come in contact with clip, and clip should not require sealant to maintain a weathertight condition.

4. Galvalume coated sheet steel, Type AZ-50, Grade 50 as described in ASTM A792; 24 gauge.

5. Finish: Two coat coil applied, baked-on full-strength (70% resin, PVF2) fluorocarbon coating consisting of a nominal 0.25 mil dry film thickness primer, and a nominal dry film thickness of 0.7 - 0.8 mil color coat for a total 0.9 to 1.1 mil total system dry film thickness. Finish to be selected from manufacturer's standard color selection. The back side of the material should be 0.25 mil primer and 0.25 mil polyester wash coat.

6. Roof panel system must allow individual roof panel removal and replacement from any point on the roof without damage to adjacent roof panel(s).

7. Roof panel system must be approved by manufacturer to be installed on slopes as low as ½:12.

8. Panels must be furnished and installed in continuous lengths from ridge to eave with no overlaps. Panels too long to ship will be manufactured on site using manufacturer's employees and equipment.

9. Panel surface characteristics to be Smooth

10. Manufacturer weathertightness warranty meeting requirements of this Section.

11. Color: As selected by Owner/Architect from manufacturer's full range of colors.

E. Underlayment Materials

1. Polyethylene Sheet: 6-mil thick polyethylene sheet complying with ASTM D 4397.

2. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felts.

3. Self-Adhering, High Temperature Sheet: Minimum 40 mils thick, consisting of slip resisting polyethylene film top surface laminated to layer of butyl or SBS modified asphalt adhesive, with release paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

(a) Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.

(b) Low temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F

(c) Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.

2.2 PERFORMANCE/DESIGN CRITERIA

A. Thermal Movement: Metal Roofing system, including flashing, shall accommodate unlimited thermal movement without buckling or excess stress on the structure.

B. Roof panel and trim attachments will be designed to satisfy the requirements of the roof design (shown in shop drawings).

C. Maximum wind uplift capacity of roof system shall be determined using ASTM E 1592 test results, with an appropriate Factor of Safety in accordance with AISI S-100.

D. Panel system shall be designed in accordance with the local building code and ASCE7 for project location with respect to appropriate Exposure category, Importance Factor and Factor of Safety in accordance with AISI S-100.

E. Tested and listed by Underwriters Laboratories to comply with UL 580 for wind uplift Class 90 rating.

2.3 ACCESSORIES

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components. Provide components required for a complete sheet metal roofing assembly including trim,

copings, fasciae, corner units, clips, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items. Match material and finish of sheet metal roofing unless otherwise indicated.

1. Install components required for a complete sheet metal roofing assembly including trim, copings, seam covers, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items.

2. Install accessories integral to sheet metal roofing that are specified in Division 07 Section "Sheet Metal Flashing and Trim" to comply with that Section's requirements.

B. Panel Clip Screw - screw required in wind uplift rating requirements and design specification for application, with corrosion-resistant coating, in length necessary to penetrate substrate minimum 3/4 inch., as supplied by roof panel manufacturer. C. Roof Panel Clip:

1. Intermittent Clip: 16 gauge galvanized steel, one-piece, designed to allow roof panel thermal movement and not contact roof panel cap, as supplied by roof panel manufacturer, meeting wind uplift requirements and design criteria of this section.

2. Intermittent Clip Bearing Plate: If required, in gauge, size and finish as supplied by and approved by roof panel manufacturer for use in roof panel manufacturer's full assembly warranted systems.

3. Multi-Span Clip: As provided by roof panel manufacturer for full assembly warranted systems.

D. Trim and flashing will be of the same gauge and finish unless approved otherwise by the metal roof system manufacturer and shall comply with performance requirements, manufacturer's written installation instructions, SMACNA's "Architectural Sheet Metal Manual". Provide concealed fasteners where possible, and set units true to line and level as indicated. Installed work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Ridge closures, consisting of metal channel surrounding factory precut closed cell foam, will not be secured through the field of the panel.

2. Trim will be installed specifically as displayed in the manufacturer provided shop drawings. Proposed changes must be approved in writing by the metal roof system manufacturer.

E. Concealed supports, angles, plates, accessories and brackets: gauge and finish as recommended, and furnished by manufacturer.

F. Accessory Screw: Size and screw type as provided by panel manufacturer for each use, with prefinished hex washer head in color to match panels where exposed to view. G. Rivets: full stainless steel, including mandrel, in size to match application.

H. Field Sealant:

1. Exposed Sealant: Color coordinated urethane or polymer sealant as supplied by panel manufacturer.

2. Non-exposed Sealant: Non-curing, non-skinning, butyl tape or tube sealant as supplied by manufacturer.

I. Sealant Tape: non-drying, 100 percent solids, high grade butyl tape, as supplied by panel manufacturer, in sizes to match application.

J. Pipe Penetration Flashings: 20 year warranted flexible boot type, with stainless steel compression ring. Use silicone type at hot pipes.

K. Metal Roof Curbs: 0.063 minimum thickness welded aluminum, or 18 gauge minimum welded stainless steel, factory-insulated, with integral cricket, and designed to fit roof panel module, sized to meet application.

PART 3 - EXECUTION

3.1 INSTALLERS

A. Must be certified and qualified by Manufacturer.

3.2 EXAMINATION

A. Verification of Conditions

1. Ensure surfaces are ready for panel application.

2. Inspect and ensure surfaces are free from objectionable warp, wave, and buckle before proceeding with installation of pre-formed metal roofing.

3. Ensure substrate is ready to receive metal roofing. Report items for correction and do not proceed with metal roof panel system installation until resolved.

3.3 PREPARATION

A. Install substrate boards, hat channels, purlins, or furring channels in accordance with manufacturer’s recommendations.

B. Coordinate Work, with installation of other associated Work, to ensure quality application.

C. Coordinate Work with installation of associated metal flashings and building walls.

D. Coordinate Work to minimize foot traffic and construction activity on installed finished surfaces.

E. Coordinate location of pipe penetrations to allow centering of pipe in panel.

F. Coordinate location of roof curbs, to allow proper integration with roof panel seams.

3.4 INSTALLATION

A. Comply with and install roofing and flashings in accordance with all details shown on manufacturer's approved shop drawings and manufacturer's product data, instructions, and installation manuals, within specified erection tolerances.

B. Install field panels in continuous lengths, without endlaps

C. Do not install panels damaged by shipment or handling.

D. Install intermittent clips with bearing plates, if required, and continuous clips, if required, according to the engineered design pattern in the field, perimeter, and corner areas of the roof.

E. Fix panels at location depicted on reviewed shop drawing(s).

F. Fold up pan of panel at ridge, hip and headwalls. Commonly referred to as breadpanning.

G. Allow for required panel clearance at penetrations for thermal movement.

H. Install concealed supports, angles and brackets as furnished by manufacturer to form complete assemblies.

I. Remove roof panel and flashing protective film prior to extended exposure to sunlight, heat, and other weather elements.

J. Field-apply sealant tape and gun-grade sealant according to reviewed shop drawings and manufacturer's requirements for airtight, watertight installation.

K. Ensure sealant beads and tapes are applied prior to sheet metal installation to achieve a concealed bead. Neatly trim exposed portions of sealant without damaging roof panel or flashing finish.

L. Align pipe penetrations to occur at center of roof panel. Report and have corrected improperly-placed penetrations before proceeding with panel installation. Remove and replace roof panels which have improperly-placed penetration flashings.

M. Align roof curbs to fit roof panel module and overlap standing seam(s). Allow for proper drainage on both sides of curb.

N. Install sheet metal flashings according to manufacturer's recommendations, reviewed shop drawings and in accordance with provision of Section 07 62 00.

3.5 CLEANING

A. Clean exposed surfaces of work promptly after completion of installation of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials, clean off excess solder and sealants, mud, dirt, and construction-related debris from panels before panels are scratched or marred.

3.6 PROTECTION

A. Protect Work as required to ensure roofing will be without damage at time of final completion.

B. Do not allow excessive foot traffic over finished surfaces.

C. Do not track mud, dirt, or construction-related debris onto panel surfaces.

D. Replace damaged Work before final completion.

END OF SECTION

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manufactured reglets and counterflashing.
2. Formed roof drainage sheet metal fabrications.
3. Formed low-slope roof sheet metal fabrications.
4. Formed wall sheet metal fabrications.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.

1. Include details for forming, joining, supporting, and securing sheet metal flashing and trim, including pattern of seams, termination points, fixed points, expansion joints, expansion-joint covers, edge conditions, special conditions, and connections to adjoining work.

C. Samples: For each exposed product and for each finish specified.

D. Maintenance data.

E. Warranty: Sample of special warranty.

1.3 QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical roof eave, including fascia trim, apron flashing, approximately 10 feet long, including supporting construction cleats, seams, attachments, underlayment, and accessories.

C. Preinstallation Conference: Conduct conference at Project site.

1.4 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, ct coating designation; structural quality.
2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; structural quality.
3. Surface: Manufacturer's standard clear acrylic coating on both sides.
4. Exposed Coil-Coated Finish:

    a. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.

5. Color: As selected by Architect from manufacturer's full range.

2.2 UNDERLAYMENT MATERIALS

A. Polyethylene Sheet: thick polyethylene sheet complying with ASTM D 4397.

B. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

C. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.

D. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

    a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
    b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
    c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
4. Fasteners for Aluminum-Zinc Alloy-Coated Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.

C. Solder:
1. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

E. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

H. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 REGLETS

A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with interlocking counterflashing on exterior face, of same metal as reglet.

1. Material: Galvanized steel, 0.022 inch thick.
2. Finish: With manufacturer's standard color coating.

2.5 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.

1. Obtain field measurements for accurate fit before shop fabrication.
2. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

C. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

E. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

F. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

G. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof-Edge Flashing and Fascia Cap: Fabricate in minimum 96-inch- long, but not exceeding 10-foot- long, sections. Furnish with 6-inch- wide, joint cover plates. Fabricate from the following materials:

1. Galvanized Steel: 0.028 inch thick.

B. Copings: Fabricate in minimum 96-inch- long, but not exceeding 10-foot- long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners or interior leg. Miter corners, seal, and solder or weld watertight. Fabricate from the following materials:
1. Galvanized Steel: 0.040 inch thick.

C. Base Flashing: Fabricate from the following materials:
1. Galvanized Steel: 0.028 inch thick.

D. Counterflashing and Flashing Receivers: Fabricate from the following materials:
1. Galvanized Steel: 0.022 inch thick.

E. Roof-Penetration Flashing: Fabricate from the following materials:
1. Galvanized Steel: 0.028 inch thick.

2.7 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- long, but not exceeding 12-foot- long, sections, under copings, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings. Form with 2-inch- high, end dams where flashing is discontinuous. Fabricate from the following materials:
1. Stainless Steel: 0.016 inch thick.

B. Opening Flashings in Frame Construction: Fabricate head, sill jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- high, end dams minimum or as detailed. Fabricate from the following materials:
1. Galvanized Steel: 0.022 inch thick.

PART 3 - EXECUTION

3.1 UNDERLAYMENT INSTALLATION

A. Apply in shingle fashion to shed water, with lapped and taped joints of not less than 2 inches.

B. Felt Underlayment: Install felt underlayment with adhesive for temporary anchorage. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement so that completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
5. Install sealant tape where indicated.
6. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.

1. Coat back side of uncoated aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

E. Seal joints as shown and as required for watertight construction.

F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.

1. Do not solder metallic-coated steel and aluminum sheet.
2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

G. Rivets: Rivet joints in uncoated aluminum where indicated and where necessary for strength.

3.3 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.

C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant.

E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.4 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Through-Wall Flashing: Installation of through-wall flashing is specified in Division 04 Section "Unit Masonry and Stone Cladding."

C. Reglets: Installation of reglets is specified in Division 04 Section "Unit Masonry."

D. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.5 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION 076200

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Roof curbs.
2. Equipment supports.

1.2 SUBMITTALS

A. Product Data: For each type of roof accessory indicated.

B. Shop Drawings: Show fabrication and installation details for roof accessories.

C. Samples: For each type of exposed factory-applied color finish required and for each type of roof accessory indicated, prepared on Samples of size to adequately show color.

1.3 QUALITY ASSURANCE

A. Sheet Metal Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.

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, manufacturers listed in other Part 2 articles.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers listed in other Part 2 articles.

2.2 METAL MATERIALS

A. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 coated and mill phosphatized for field painting.

B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, AZ50 coated.

C. Prepainted, Metallic-Coated Steel Sheet: Steel sheet metallic coated by hot-dip process and prepainted by coil-coating process to comply with ASTM A 755/A 755M.

1. Galvanized Steel Sheet: ASTM A 653/A 653M, G90coated.
2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coated.
3. Exposed Finishes: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight.

D. Aluminum Sheet: ASTM B 209, alloy and temper recommended by manufacturer for type of use and mill finish. Coil-coat finish as follows:

1. Powder-Coat Finish: Immediately after cleaning and pretreating, electrostatically apply manufacturer's standard baked-polymer thermosetting powder finish.

2.3 MISCELLANEOUS MATERIALS

A. Acrylic Glazing: ASTM D 4802, thermoformable, monolithic sheet, category as standard with manufacturer, Type UVA (formulated with UV absorber), Finish 1 (smooth or polished).

2.4 ROOF CURBS

A. Roof Curbs: Provide metal roof curbs, internally reinforced and capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported on roof curbs. Fabricate with welded or sealed mechanical corner joints, with integral metal cant and integral formed mounting flange at perimeter bottom. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1. Available Manufacturers:

    a. Colony Custom Curbs.
    b. Commodity Products Company, Inc.
    c. Conn-Fab Sales, Inc.
    d. Curbs Plus Inc.
    e. Custom Curb, Inc.
    f. LM Curbs.
    g. Loren Cook Company.
    h. Metallic Products Corporation.
    i. Pate Company (The).
    j. Roof Products & Systems Corporation.
    k. Roof Products, Inc.
    l. Thaler Metal Industries Ltd.
    m. ThyCurb; Div. of Thybar Corporation.
    n. Uni-Curb, Inc.
    o. Vent Products Company, Inc.

2. Liner: Same material as curb, of manufacturer's standard thickness and finish.
3. Factory install wood nailers at tops of curbs.

4. Factory insulate curbs with 1-1/2-inch- thick, cellulosic-fiber board insulation.
5. Curb height may be determined by adding thickness of roof insulation and minimum base flashing height recommended by roofing membrane manufacturer. Fabricate units to minimum height of 12 inches, unless otherwise indicated.
6. Sloping Roofs: Where slope of roof deck exceeds 1:48, fabricate curb units with water diverter or cricket and with height tapered to match slope to level tops of units.

2.5 EQUIPMENT SUPPORTS

A. Equipment Supports: Provide metal equipment supports, internally reinforced and capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported. Fabricate with welded or sealed mechanical corner joints, with integral metal cant and integral formed mounting flange at perimeter bottom. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1. Available Manufacturers:

    a. Colony Custom Curbs.
    b. Commodity Products Company, Inc.
    c. Conn-Fab Sales, Inc.
    d. Curbs Plus Inc.
    e. Custom Curb, Inc.
    f. LM Curbs.
    g. Loren Cook Company.
    h. Metallic Products Corporation.
    i. Pate Company (The).
    j. Roof Products & Systems Corporation.
    k. Roof Products, Inc.
    l. Thaler Metal Industries Ltd.
    m. ThyCurb; Div. of Thybar Corporation.
    n. Uni-Curb, Inc.

2. Material: Aluminum-zinc alloy-coated steel sheet, 0.079 inch thick.
3. Material: Aluminum sheet, 0.090 inch thick.

    a. Finish: Powder coat.
    b. Finish: Color anodic.

4. Factory-install continuous wood nailers 3-1/2 inches wide at tops of equipment supports.
5. Metal Counterflashing: Manufacturer's standard removable counterflashing, fabricated of same metal and finish as equipment support.
6. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
7. Fabricate units to minimum height of 12 inches, unless otherwise indicated.
8. Sloping Roofs: Where slope of roof deck exceeds 1:48, fabricate curb units with water diverter or cricket and with height tapered to match slope to level tops of units.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install roof accessories according to manufacturer's written instructions. Anchor roof accessories securely in place and capable of resisting forces specified. Use fasteners, separators, sealants, and other miscellaneous items as required for completing roof accessory installation. Install roof accessories to resist exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. Install roof accessories to fit substrates and to result in watertight performance.

C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing exposed-to-view components of roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene underlayment.
3. Bed flanges in thick coat of asphalt roofing cement where required by roof accessory manufacturers for waterproof performance.

D. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.

E. Seal joints with elastomeric sealant as required by manufacturer of roof accessories.

END OF SECTION 077200

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes joint sealants for the following applications, including those specified by reference to this Section:

1. Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
2. Exterior joints in horizontal traffic surfaces.
3. Interior joints in vertical surfaces and horizontal nontraffic surfaces.
4. Interior joints in horizontal traffic surfaces.

B. See Division 32 Section "Concrete Paving Joint Sealants" for sealing joints in pavements, walkways, and curbing.

C. See Division 08 Section "Glazing" for glazing sealants.

1.2 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

C. Preconstruction field test reports.

D. Compatibility and adhesion test reports.

E. Product certificates.

1.4 QUALITY ASSURANCE

A. Preconstruction Compatibility and Adhesion Testing: Submit samples of materials that will contact or affect joint sealants to joint-sealant manufacturers for testing according to

manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

B. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to Project joint substrates according to the method in ASTM C 1193 that is appropriate for the types of Project joints.

C. Mockups: Build mockups incorporating sealant joints, as follows, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:

1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.

1.5 WARRANTY

A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Nonmembrane Roof Sealants: 300 g/L.
3. Single-Ply Roof Membrane Sealants: 450 g/L.
4. Sealant Primers for Nonporous Substrates: 250 g/L.
5. Sealant Primers for Porous Substrates: 775 g/L.
6. Modified Bituminous Sealant Primers: 500 g/L.

C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Suitability for Immersion in Liquids. Where elastomeric sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247 and qualify for the length of exposure indicated by reference to ASTM C 920 for Class 1 or 2. Liquid used for testing sealants is deionized water, unless otherwise indicated.

D. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

E. Multicomponent Nonsag Polysulfide Sealant:

1. Available Products:

   a. Pacific Polymers, Inc.; Elasto-Seal 227 Type II (Gun Grade).
   b. Pecora Corporation; Synthacalk GC-2+.
   c. Polymeric Systems Inc.; PSI-350.
   d. PolySpec Corp.; T-2235-M.
   e. PolySpec Corp.; T-2282.
   f. PolySpec Corp.; Thiokol 2P.
   g. Sonneborn, Division of ChemRex Inc.; Sonolastic Polysulfide Sealant.

2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 25.
4. Use[**s**] Related to Exposure: T (traffic) and NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

F. Multicomponent Nonsag Immersible Polysulfide Sealant:

1. Available Products:

a. Pecora Corporation; GC-2+
b. PolySpec Corp.; T-2235-M.

2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 25.
4. Uses Related to Exposure: T (traffic), NT (nontraffic), and I (immersible), Class [**1**] [**2**].
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

G. Multicomponent Pourable Polysulfide Sealant:

1. Available Products:

a. Meadows, W. R., Inc.; Deck-O-Seal.
b. Pacific Polymers, Inc.; Elastoseal 227 Type I (Pourable).

2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 25.
4. Uses Related to Exposure: T (traffic) and NT (nontraffic).

H. Multicomponent Nonsag Neutral-Curing Silicone Sealant:

1. Available Products:

a. Dow Corning Corporation; 756 H.P or equal.

2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 50.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

I. Single-Component Pourable Neutral-Curing Silicone Sealant:

1. Available Products:

a. Dow Corning Corporation; 890-SL.
b. Pecora Corporation; 300 Pavement Sealant (Self Leveling).
c. Dow Corning Corporation; SL Parking Structure Sealant.

2. Type and Grade: S (single component) and P (pourable).
3. Class: 100/50.
4. Use[s] Related to Exposure: NT and T (traffic).
5. Uses Related to Joint Substrates: M, A and O, as applicable to joint substrates indicated.

J. Single-Component Neutral- and Basic-Curing Silicone Sealant:

1. Available Products:

a. Dow Corning Corporation; 790.

b. GE Silicones; SilPruf LM SCS2700.
c. Tremco; Spectrem 1 (Basic).
d. GE Silicones; SilPruf SCS2000.
e. Pecora Corporation; 864.
f. Pecora Corporation; 890.
g. Polymeric Systems Inc.; PSI-641.
h. Sonneborn, Division of ChemRex Inc.; Omniseal.
i. Tremco; Spectrem 3.
j. Dow Corning Corporation; 791.
k. Dow Corning Corporation; 795.
l. GE Silicones; SilPruf NB SCS9000.
m. GE Silicones; UltraPruf II SCS2900.
n. Pecora Corporation; 865.
o. Pecora Corporation; 895.
p. Pecora Corporation; 898.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 50.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.

K. Single-Component Neutral-Curing Silicone Sealant:

Available Products:

a. Dow Corning Corporation; 799.
b. GE Silicones; UltraGlaze SSG4000.
c. GE Silicones; UltraGlaze SSG4000AC.
d. Polymeric Systems Inc.; PSI-631.
e. Schnee-Morehead, Inc.; SM5731 Poly-Glaze Plus.
f. Tremco; Proglaze SG.
g. Tremco; Spectrem 2.
h. Tremco; Tremsil 600 or equal.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

L. Single-Component Acid-Curing Silicone Sealant:

1. Available Products:

a. Bostik Findley; Chem-Calk 1200.
b. Dow Corning Corporation; 999-A.
c. Dow Corning Corporation; Trademate Glazing.

d. GE Silicones; Construction SCS1200.
e. GE Silicones; Contractors SCS1000.
f. GE Silicones; Sanitary SCS1700.
g. Pecora Corporation; 860.
h. Polymeric Systems Inc.; PSI-601.
i. Polymeric Systems Inc.; PSI-613.
j. Schnee-Morehead, Inc.; SM5732 Polyglaze.
k. Sonneborn, Division of ChemRex Inc.; OmniPlus.
l. Tremco; Proglaze.
m. Tremco; Tremsil 200.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.

M. Single-Component Mildew-Resistant Neutral-Curing Silicone Sealant:

1. Available Products:

a. Pecora Corporation; 898.
b. Tremco; Tremsil 600 White.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

N. Single-Component Mildew-Resistant Acid-Curing Silicone Sealant:

1. Available Products:

a. Dow Corning Corporation; 786 Mildew Resistant.
b. GE Silicones; Sanitary SCS1700.
c. Tremco; Tremsil 200 Clear.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.

O. Multicomponent Nonsag Urethane Sealant:

1. Available Products:

a. Pecora Corporation; Dynatrol II.
b. Tremco; Dymeric 511.
c. Tremco; Vulkem 922.
d.

2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 50.
4. Use[s] Related to Exposure: NT (nontraffic) and T (traffic).
5. Uses Related to Joint Substrates: M, **G,** and A, and, as applicable to joint substrates indicated, O.

P. Multicomponent Nonsag Urethane Sealant:

1. Available Products:

    a. Schnee-Morehead, Inc.; Permathane SM 7200.
    b. Sika Corporation, Inc.; Sikaflex - 2c NS TG.
    c. Sonneborn, Division of ChemRex Inc.; NP 2.
    d. Tremco; Vulkem 227.
    e. Tremco; Vulkem 322 DS.

2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 25.
4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
5. Uses Related to Joint Substrates: M, **G,** A, and, as applicable to joint substrates indicated, O.

Q. Multicomponent Nonsag Urethane Sealant:

1. Available Products:

    a. Bostik Findley; Chem-Calk 500.
    b. Pacific Polymers, Inc.; Elasto-Thane 227 R Type II (Gun Grade).
    c. Polymeric Systems Inc.; PSI-270.
    d. Tremco; Dymeric.

2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 25.
4. Additional Movement Capability: 40 percent movement in extension and 25 percent in compression for a total of 65 percent movement.
5. Use Related to Exposure: NT (nontraffic).
6. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

R. Multicomponent Nonsag Urethane Sealant:

1. Available Products:

    a. Pacific Polymers, Inc.; Elasto-Thane 227 High Shore Type II (Gun Grade).
    b. Pacific Polymers, Inc.; Elasto-Thane 227 Type II (Gun Grade).
    c. Pecora Corporation; Dynatred.
    d. Polymeric Systems Inc.; PSI-270.

2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 25.

4. Use Related to Exposure: T (traffic).
5. Uses Related to Joint Substrates: M, **G,** A, and, as applicable to joint substrates indicated, O.

S. Multicomponent Nonsag Immersible Urethane Sealant:

1. Available Products:

   a. Pacific Polymers, Inc.; Elasto-Thane 227 R Type II (Gun Grade).
   b. Pecora Corporation; Dynatred.
   c. Tremco; Vulkem 227.

2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 25.
4. Use[s] Related to Exposure: T (traffic), NT (nontraffic) and I (immersible), Class 1.
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

T. Multicomponent Pourable Urethane Sealant:

1. Available Products:

   a. Bostik Findley; Chem-Calk 550.
   b. Meadows, W. R., Inc.; POURTHANE.
   c. Pacific Polymers, Inc.; Elasto-Thane 227 High Shore Type I (Self Leveling).
   d. Pacific Polymers, Inc.; Elasto-Thane 227 Type I (Self Leveling).
   e. Pecora Corporation; Urexpan NR-200.
   f. Polymeric Systems Inc.; PSI-270SL.
   g. Schnee-Morehead, Inc.; Permathane SM 7201.
   h. Tremco; THC-901.
   i. Tremco; THC-900.
   j. Tremco; Vulkem 245.
   k. Pecora Corporation; Urexpan NR 300, Type H.
   l. Pecora Corporation; Urexpan NR 300, Type M.

2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 25.
4. Use Related to Exposure: T (traffic).
5. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.

U. Multicomponent Pourable Urethane Sealant:

1. Available Products:

   a. Pecora Corporation; Dynatrol II-SG.
   b. Sika Corporation, Inc.; Sikaflex - 2c SL.
   c. Sonneborn, Division of ChemRex Inc.; SL 2.

2. Type and Grade: M (multicomponent) and P (pourable).

3. Class: 25.
4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

V. Multicomponent Pourable Immersible Urethane Sealant:

1. Available Products:

   a. Pacific Polymers, Inc.; Elasto-Thane 227 R Type II (Self Leveling).
   b. Tremco; Vulkem 245.

2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 25.
4. Uses Related to Exposure: T (traffic), NT (nontraffic) and I (immersible), Class 1.
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

W. Single-Component Nonsag Urethane Sealant:

1. Available Products:

   a. Sika Corporation, Inc.; Sikaflex - 1a.
   b. Sonneborn, Division of ChemRex Inc.; Ultra.
   c. Sonneborn, Division of ChemRex Inc.; NP 1.
   d. Tremco; Vulkem 116.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

X. Single-Component Nonsag Urethane Sealant:

1. Available Products:

   a. Bostik Findley; Chem-Calk 900.
   b. Bostik Findley; Chem-Calk 915.
   c. Bostik Findley; Chem-Calk 916 Textured.
   d. Bostik Findley; Chem-Calk 2639.
   e. Pecora Corporation; Dynatrol I-XL.
   f. Polymeric Systems Inc.; Flexiprene 1000.
   g. Polymeric Systems Inc.; PSI-901.
   h. Schnee-Morehead, Inc.; Permathane SM7100.
   i. Schnee-Morehead, Inc.; Permathane SM7108.
   j. Schnee-Morehead, Inc.; Permathane SM7110.
   k. Sika Corporation, Inc.; Sikaflex 15LMg
   l. Tremco; DyMonic.
   m. Tremco; Vulkem 921.

n. Tremco; Vulkem 931.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 100/50.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

Y. Multicomponent Nonsag Immersible Urethane Sealant:

1. Available Products:

   a. Tremco; Vulkem 116.
   b. Tremco; Vulkem 921.

2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 50.
4. Uses Related to Exposure**:** T (traffic) and NT (nontraffic), NT (nontraffic**)** and I (immersible), Class 2.
5. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.

Z. Single-Component Pourable Urethane Sealant:

1. Available Products:

   a. Sika Corporation, Inc.; Sikaflex - 1CSL.
   b. Sonneborn, Division of ChemRex Inc.; SL 1.
   c. Tremco; Vulkem Nova 300 SSL.

2. Type and Grade: S (single component) and P (pourable).
3. Class: 50.
4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

AA. Single-Component Pourable Urethane Sealant:

1. Available Products:

   a. Bostik Findley; Chem-Calk 950.
   b. Pecora Corporation; Urexpan NR-201.
   c. Polymeric Systems Inc.; Flexiprene 952.
   d. Schnee-Morehead, Inc.; Permathane SM7101.
   e. Tremco; Tremflex S/L.
   f. Tremco; Vulkem 45.

2. Type and Grade: S (single component) and P (pourable).
3. Class: 25.
4. Use Related to Exposure: T (traffic).

5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

2.4 SOLVENT-RELEASE JOINT SEALANTS

A. Acrylic-Based Solvent-Release Joint Sealant: Comply with ASTM C 1311 or FS TT-S-00230.

1. Available Products:

a. Schnee-Moorehead, Inc.; Acryl-R Acrylic Sealant.
b. Tremco; Mono 555.

B. Butyl-Rubber-Based Solvent-Release Joint Sealant: Comply with ASTM C 1085.

1. Available Products:

a. Bostik Findley; Bostik 300.
b. Fuller, H. B. Company; SC-0296.
c. Fuller, H. B. Company; SC-0288.
d. Pecora Corporation; BC-158.
e. Polymeric Systems Inc.; PSI-301.
f. Sonneborn, Division of ChemRex Inc.; Sonneborn Multi-Purpose Sealant.
g. Tremco; Tremco Butyl Sealant.

C. Pigmented Narrow-Joint Sealant: Manufacturer's standard, solvent-release-curing, pigmented, synthetic-rubber sealant complying with AAMA 803.3 and formulated for sealing joints 3/16 inch or smaller in width.

1. Available Products:

a. Fuller, H. B. Company; SC-0289.
b. Schnee-Morehead, Inc.; SM 5504 Acryl-R Narrow Joint Sealant.

2.5 LATEX JOINT SEALANTS

A. Latex Sealant: Comply with ASTM C 834, Type O P, Grade NF.

B. Available Products:

1. Bostik Findley; Chem-Calk 600.
2. Pecora Corporation; AC-20+.
3. Schnee-Morehead, Inc.; SM 8200.
4. Sonneborn, Division of ChemRex Inc.; Sonolac.
5. Tremco; Tremflex 834.

2.6 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Available Products:

a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.

B. Acoustical Sealant for Concealed Joints: Manufacturer's standard, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.

1. Available Products:

a. Pecora Corporation; BA-98.
b. Tremco; Tremco Acoustical Sealant.

2.7 PREFORMED JOINT SEALANTS

A. Preformed Silicone-Sealant System: Manufacturer's standard system consisting of precured low-modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral-curing silicone sealant for bonding extrusions to substrates.

1. Available Products:

a. Dow Corning Corporation; 123 Silicone Seal.
b. GE Silicones; UltraSpan US1100.
c. Pecora Corporation; Sil-Span.
d. Tremco; Spectrem Ez Seal.

B. Preformed Foam Sealant: Manufacturer's standard mildew-resistant, nonmigratory, nonstaining, preformed, precompressed, open-cell foam sealant that is manufactured from high-density urethane foam impregnated with a nondrying, water-repellent agent.

1. Available Products:

a. EMSEAL Joint Systems, Ltd.; Emseal 25V.
b. illbruck Sealant Systems, Inc.; Wilseal 600.
c. Polytite Manufacturing Corporation; Polytite B.
d. Polytite Manufacturing Corporation; Polytite Standard.
e. Sandell Manufacturing Co., Inc.; Polyseal.

f. Density: Manufacturer's standard.

2.8 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin)] [O (open-cell material), B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.9 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants.

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant.

a. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.

2. Remove laitance and form-release agents from concrete.

a. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION

A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

B. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.

3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

G. Installation of Preformed Silicone-Sealant System: Comply with manufacturer's written instructions.

H. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, producing seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in compliance with sealant manufacturer's written instructions.

I. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.3 JOINT-SEALANT SCHEDULE

3.4 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants, General: ASTM C 920.

B. Low-Modulus Nonacid-Curing Silicone Sealant:

1. Available Products:

a. Dow Corning; 790.
b. Ohio Sealants, Inc.; VP 275.
c. Polymeric Systems, Inc.; PSI-641.
d. Sonneborn Building Products Div., ChemRex Inc.; Omniseal.
e. Tremco; Spectrem 1.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Additional Movement Capability: Capable of 50 percent movement in extension and 50 percent movement in compression when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719.

5. Exposure: Use NT (nontraffic).
6. Substrates: Uses M, G, A, and, as applicable to joint substrates indicated, O.

C. Mildew-Resistant Silicone Sealant:

1. Available Products:

   a. Dow Corning; 786 Mildew Resistant.
   b. GE Silicones; Sanitary 1700.
   c. NUCO Industries, Inc.; NuFlex 302.
   d. Pecora Corporation; 898 Silicone Sanitary Sealant.
   e. Polymeric Systems, Inc.; PSI-611.
   f. Tremco; Tremsil 600 White.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Exposure: Use NT (nontraffic).
5. Substrates: Uses G, A, and, as applicable to joint substrates indicated, O.
6. Exposure: Use NT (nontraffic).
7. Substrates: M and, as applicable to joint substrates indicated, O.

D. Multicomponent Nonsag Urethane Sealant:

1. For joints not subject to traffic and requiring additional movement capability, provide the following:

   a. Available Products:

      1) Mameco International; Vulkem 922.
      2) Pecora Corporation; Dynatrol II.
      3) Polymeric Systems, Inc.; Flexiprene 2000.
      4) Sika Corporation; Sikaflex - 2c NS.
      5) Tremco; DYmeric 511.

   b. Type and Grade: M (multicomponent) and NS (nonsag).
   c. Class: 25.
   d. Additional Movement Capability: 50 percent movement in extension and 50 percent in compression when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719.
   e. Exposure: Use NT (nontraffic).
   f. Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

2. For joints subject to traffic, provide the following:

   a. Available Products:

      1) Bostik Inc.; Chem-Calk 2641.
      2) Mameco International; Vulkem 922.
      3) Pacific Polymers, Inc.; Elasto-Thane 920 Gun Grade.
      4) Pecora Corporation; Dynatred.

5) Polymeric Systems, Inc.; PSI-270.
6) Sonneborn Building Products Div., ChemRex Inc.; NP 2.
7) Type and Grade: M (multicomponent) and NS (nonsag).

b. Class: 25.
c. Exposure: Use T (traffic) .
d. Substrates: Uses M,G, A, and, as applicable to joint substrates indicated, O.

3. For joints not subject to traffic:

a. Available Products:

1) Bostik Inc.; Chem-Calk 500.
2) Polymeric Systems, Inc.; PSI-501/RC-2.
3) Tremco; DYmeric.

b. Type and Grade: M (multicomponent) and NS (nonsag).
c. Class: 25.
d. Exposure: Use NT (nontraffic).
e. Substrates: Uses M, G, A, and, as applicable to joint substrates indicated, O.

E. Single-Component Nonsag Urethane Sealant:
1. For joints not subject to traffic, provide the following:

a. Available Products:
1) Mameco International; Vulkem 921.
2) Ohio Sealants, Inc.; PR-255.
3) Pecora Corporation; Dynatrol I.
4) Schnee-Morehead, Inc.; SM7100 Permathane.
5) Tremco; DyMonic.
b. Class: 25.
c. Exposure: Use NT (nontraffic).
d. Substrates: Uses M, G, A, and, as applicable to joint substrates indicated, O.

3.5 LATEX JOINT SEALANTS

A. Latex Sealant: ASTM C 834.

1. Available Products:

a. Bostik Inc.; Chem-Calk 600.
b. NUCO Industries, Inc.; NuFlex 330.
c. Ohio Sealants, Inc.; LC 160 All Purpose Acrylic Caulk.
d. Pecora Corporation; AC-20.
e. Polymeric Systems, Inc.; PSI-701.
f. Sonneborn Building Products Div., ChemRex, Inc.; Sonolac.
g. Tremco; Tremflex 834.

3.6 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Available Products:

a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
b. USG Corp., United States Gypsum Co.; SHEETROCK Acoustical Sealant.

B. Acoustical Sealant for Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.

1. Available Products:

a. Ohio Sealants, Inc.; Pro-Series SC-170 Rubber Base Sound Sealant.
b. Pecora Corporation; BA-98.
c. Tremco; Tremco Acoustical Sealant.

3.7 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

1. Type: C, O, or B, subject to manufacturer's approval.

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

3.8 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 4 - EXECUTION

4.1 INSTALLATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants.

1. Remove foreign material from joint substrates that could interfere with adhesion of joint sealant.
2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues could interfere with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

D. Sealant Installation: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

E. Acoustical Sealant Installation: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

F. Install sealant backings to support sealants during application and at position required to produce optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.

3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

G. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.

H. Place sealants so they directly contact and fully wet joint substrates.

1. Completely fill recesses provided for each joint configuration.
2. Produce uniform, cross-sectional shapes and depths that allow optimum sealant movement capability.

I. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.
2. Use tooling agents that are approved by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Joint Configuration: Concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

J. Installation of Preformed Silicone-Sealant System:

1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
2. Complete installation of horizontal joints before installing vertical joints. Lap vertical joints over horizontal joints. At end of joints, cut silicone extrusion with a razor knife.

K. Clean excess sealants or sealant smears adjacent to joints as installation progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

4.2 JOINT SEALANT SCHEDULE

A. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:
1. Control and Expansion Joints in Unit Masonry.
2. Joints in Stone Cladding.
3. Joints between Different Materials Listed above.
4. Perimeter Joints between Materials Listed above and Frames of Doors and Windows.

B. Exterior joints in the following horizontal traffic surfaces:
1. Joints in Stone Paving Units.
2. Joints in concrete pavement.

C. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:

1. Control and Expansion Joints on Exposed Interior Surfaces of Exterior Walls.
2. Perimeter Joints of Exterior Openings Where Indicated.
3. Tile Control and Expansion Joints.

4. Vertical Control Joints on Exposed Surfaces of Interior Unit Masonry and Concrete Walls and Partitions.
5. Perimeter Joints between Interior Wall Surfaces and Frames of Interior Doors, Windows, and Elevator Entrances.
6. Joints between Plumbing Fixtures and Adjoining Walls, Floors, and Counters.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Standard hollow metal doors and frames.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required.

E. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.3 QUALITY ASSURANCE

A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252.

1. Temperature-Rise Limit: Where indicated, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Amweld Building Products, LLC.
2. Benchmark; a division of Therma-Tru Corporation.
3. Ceco Door Products; an Assa Abloy Group company.

4. Curries Company; an Assa Abloy Group company.
5. Deansteel Manufacturing Company, Inc.
6. Firedoor Corporation.
7. Fleming Door Products Ltd.; an Assa Abloy Group company.
8. Habersham Metal Products Company.
9. Kewanee Corporation (The).
10. Mesker Door Inc.
11. Pioneer Industries, Inc.
12. Security Metal Products Corp.
13. Steelcraft; an Ingersoll-Rand company.
14. Windsor Republic Doors.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, CS, Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, CS, Type B.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40, G60 or A60 metallic coating.

D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z 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.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

G. Mineral-Fiber Insulation: ASTM C 665, Type I.

H. Glazing: Division 08 Section "Glazing."

I. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat.

2.3 STANDARD HOLLOW METAL DOORS

A. General: Comply with ANSI/SDI A250.8.

1. Design: Flush panel.
2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.

a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
b. Thermal-Rated (Insulated) Doors: R-value of not less than 6.0 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.

3. Vertical Edges for Single-Acting Doors: Manufacturer's standard.
4. Top and Bottom Edges: Closed with flush or inverted 0.042-inch thick, end closures or channels of same material as face sheets.
5. Tolerances: SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Comply with ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

a. Width: as indicated on Drawings.

2. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).

C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

a. Width: As indicated on Drawings.

2. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).

D. Hardware Reinforcement: ANSI/SDI A250.6.

2.4 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8.

B. Exterior Frames: Fabricated from metallic-coated (galvanized) steel sheet.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as full profile welded unless otherwise indicated.
3. Frames for Level 4 Steel Doors: 0.0781-inch- thick steel sheet.

C. Interior Frames: Fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as full profile welded unless otherwise indicated.
3. Frames for Level 2 Steel Doors: 0.0598-inch- thick steel sheet.
4. Frames for Level 3 Steel Doors: 0.0598-inch- thick steel sheet.
5. Frames for Wood Doors: 0.053-inch- thick steel sheet.

D. Hardware Reinforcement: ANSI/SDI A250.6.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.6 HOLLOW METAL PANELS

A. Provide hollow metal panels of same materials, construction, and finish as specified for adjoining hollow metal work.

2.7 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, same material as door face sheet.

B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, same material as frames.

D. Terminated Stops: Where indicated, terminate stops 6 inches above finish floor with a 45 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.

2.8 LOUVERS

A. Provide **s**ightproof louvers for interior doors, where indicated, that comply with SDI 111C, with blades or baffles formed of 0.020-inch-thick, cold-rolled steel sheet set into 0.032-inch- thick steel frame.

1. Fire-Rated Automatic Louvers: Movable blades closed by actuating fusible link, and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated.

2.9 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch wide steel.

C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

2.10 FABRICATION

A. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.

B. Hollow Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors. Seal joints in top edges of doors against water penetration.
2. Glazed Lites: Factory cut openings in doors.
3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated.

C. Hollow Metal Frames: Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
4. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
5. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Two anchors per jamb up to 60 inches high.
        2) Three anchors per jamb from 60 to 90 inches high.
        3) Four anchors per jamb from 90 to 120 inches high.
        4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

    b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

1) Three anchors per jamb up to 60 inches high.
2) Four anchors per jamb from 60 to 90 inches high.
3) Five anchors per jamb from 90 to 96 inches high.
4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
5) Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.

c. Compression Type: Not less than two anchors in each jamb.
d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

6. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers.

a. Single-Door Frames: Three door silencers.
b. Double-Door Frames: Two door silencers.

D. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Comply with applicable requirements in ANSI/SDI A250.6, Table 1 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
3. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 electrical Sections.

E. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow metal work.
5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.11 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

1. Shop Primer: ANSI/SDI A250.10.

B. Factory-Applied Paint Finish: ANSI/SDI A250.3.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

A. 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, leaving surfaces smooth and undamaged.

    a. At fire-protection-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable glazing stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

    a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
6. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
8. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

B. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors according to NFPA 105 and UBC Standard 7-2.

C. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.2 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. 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.

C. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid-core doors with medium-density-overlay faces.
2. Shop priming Field finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Sections:

1. Division 08 Section "Glazing" for glass view panels in flush wood doors.

1.2 SUBMITTALS

A. Product Data: For each type of door indicated.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate requirements for veneer matching.
4. Indicate doors to be factory finished and finish requirements.
5. Indicate fire-protection ratings for fire-rated doors.

C. Samples: For factory-finished doors.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors.

C. Forest Certification: Provide doors made with all wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

D. Retain paragraph below and one of first two options, together with one or more of last five options, if fire-rated doors are required.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Algoma Hardwoods, Inc.
2. Ampco, Inc.
3. Buell Door Company Inc.
4. Chappell Door Co.
5. Eagle Plywood & Door Manufacturing, Inc.
6. Eggers Industries.
7. Graham; an Assa Abloy Group company.
8. Haley Brothers, Inc.
9. Ideal Architectural Doors & Plywood.
10. Ipik Door Company.
11. Lambton Doors.
12. Marlite.
13. Marshfield Door Systems, Inc.
14. Mohawk Flush Doors, Inc.; a Masonite company.
15. Oshkosh Architectural Door Company.
16. Poncraft Door Company.
17. Vancouver Door Company.
18. VT Industries Inc.

2.2 DOOR CONSTRUCTION, GENERAL

A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.

B. WDMA I.S.1-A Performance Grade:
1. Extra Heavy Duty: Janitor's closets, assembly spaces, exits and where indicated.

C. Structural-Composite-Lumber-Core Doors:

1. Structural Composite Lumber: WDMA I.S.10.

a. Screw Withdrawal, Face: 700 lbf.
b. Screw Withdrawal, Edge: 400 lbf.

D. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.

1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.

2. Pairs: 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.

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors, Non-Rated:

1. Grade: Premium, with Grade A faces.
2. Species: Select white maple.
3. Cut: Quarter sliced.
4. Match between Veneer Leaves: Book match.
5. Assembly of Veneer Leaves on Door Faces: Center Balance match.
6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
7. Core: Structural composite lumber.
8. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.
9. Construction: Seven plies, either bonded or nonbonded construction.

2.4 LOUVERS AND LIGHT FRAMES

A. Metal Louvers:

1. Metal and Finish: Hot-dip galvanized steel, 0.040 inch thick, factory primed for paint finish.
2. Metal and Finish: Extruded aluminum with Class II, clear anodic finish, AA-M12C22A31.
3. Metal and Finish: Extruded aluminum with light bronze, Class II, color anodic finish, AA-M12C22A32/A34.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with requirements in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied.

C. Openings: Cut and trim openings through doors in factory.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."
3. Louvers: Factory install louvers in prepared openings.

2.6 SHOP PRIMING

A. Doors for Opaque Finish: Shop prime doors with one coat of wood primer specified in Division 09 Section "Exterior Painting" and "Interior Painting". Seal all four edges, edges of cutouts, and mortises with primer.

2.7 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Finish doors at factory that are indicated to receive transparent finish. Field finish doors indicated to receive opaque finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hardware: For installation, see Division 08 Section "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.

1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.

a. Comply with NFPA 80 for fire-rated doors.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

END OF SECTION 081416

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes access doors and frames for walls and ceilings.

1.2 SUBMITTALS

A. Product Data: For each type of access door and frame indicated.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each door face material in specified finish.

D. Schedule: Types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

1.3 COORDINATION

A. If retaining this Article, also retain "Schedule" Paragraph in "Submittals" Article.

B. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.

PART 2 - PRODUCTS

2.1 STEEL MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

1. ASTM A 123/A 123M, for galvanizing steel and iron products.
2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

1. ASTM A 123/A 123M, for galvanizing steel and iron products.
2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

C. Steel Sheet: Uncoated or electrolytic zinc-coated, ASTM A 591/A 591M with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS) with A60 zinc-iron-alloy (galvannealed) coating or G60 mill-phosphatized zinc coating.

E. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Factory-Primed Finish: Manufacturer's standard shop primer.
2. Baked-Enamel Finish: Minimum dry film thickness of 2 mils.
3. Powder-Coat Finish: Thickness not less than 1.5 mils.

F. Drywall Beads: 0.0299-inch zinc-coated steel sheet to receive joint compound.

G. Plaster Beads: 0.0299-inch zinc-coated steel sheet with flange of expanded metal lath.

H. Manufacturer's standard finish.

2.2 ALUMINUM MATERIALS

A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6, mill finish.

B. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6, mill finish.

C. Aluminum Sheet: ASTM B 209.

1. Mill finish.
2. Anodic Finish: Class I, clear anodic coating complying with AAMA 611.
3. Baked-Enamel Finish: Manufacturer's standard.

2.3 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Acudor Products, Inc.
2. Babcock-Davis; A Cierra Products Co.
3. Bar-Co, Inc. Div.; Alfab, Inc.
4. Cendrex Inc.
5. Dur-Red Products.
6. Elmdor/Stoneman; Div. of Acorn Engineering Co.
7. Jensen Industries.
8. J. L. Industries, Inc.
9. Karp Associates, Inc.
10. Larsen's Manufacturing Company.
11. MIFAB, Inc.
12. Milcor Inc.
13. Nystrom, Inc.
14. Williams Bros. Corporation of America (The).

B. Flush Access Doors and Frames with Exposed Trim: Fabricated from steel sheet.

1. Locations: Ceiling.
2. Door: Minimum 0.060-inch- thick sheet metal.
3. Frame: Minimum 0.060-inch- thick sheet metal with 1-1/4-inch-
4. wide**,** surface-mounted trim.
5. Hinges: Continuous piano.
6. Latch: Cam latch with interior release.
7. Lock: Mortise cylinder.

2.4 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, provide materials with smooth, flat surfaces without blemishes.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.

D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.

E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

1. For cylinder lock, furnish two keys per lock and key all locks alike.
2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

F. Extruded Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.

C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.2 ADJUSTING AND CLEANING

A. Adjust doors and hardware after installation for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 083113

SECTION 083613 - SECTIONAL DOORS

PART 1 - GENERAL

1.1 SUMMARY Section includes electrically operated sectional doors.

A. Related Section:

1. Division 05 Section "Metal Fabrications" for miscellaneous steel supports.

1.2 PERFORMANCE REQUIREMENTS

A. General Performance: Sectional doors shall meet performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.

B. Structural Performance: Exterior sectional doors shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Wind Loads: 110 MPH, Exposure C.

C. Air Infiltration: Maximum rate not more than indicated when tested according to ASTM E 283 or DASMA 105.

1. Air Infiltration: Maximum rate of 0.08 cfm/sq. ft. (0.406 L/s per sq. m at 15 and 25 mph (24.1 and 40.2 km/h).

D. Seismic Performance: Sectional doors shall withstand the effects of earthquake motions determined according to Category D.

1.3 SUBMITTALS

A. Product Data: For each type and size of sectional door and accessory.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each exposed product and for each color and texture specified.

D. Delegated-Design Submittal: For sectional doors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Seismic Qualification Certificates: For sectional doors**,** accessories, and components, from manufacturer.

F. Maintenance data.

G. Warranties: Sample of special warranties.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

B. 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. Standard for Sectional Doors: Fabricate sectional doors to comply with DASMA 102 unless otherwise indicated.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ALUMINUM DOOR SECTIONS

A. Sections: Construct door sections with stiles and rails formed from extruded-aluminum shapes. Join stiles and rails by welding or with concealed aluminum or nonmagnetic stainless-steel through bolts, full height of door section. Form meeting rails to provide a weathertight-seal joint.

1. Reinforce sections with continuous horizontal and diagonal reinforcement, as required to stiffen door and for wind loading. Ensure that reinforcement does not obstruct vision lites.
2. Provide reinforcement for hardware attachment.

B. Full-Vision Sections: Manufacturer's standard, tubular, aluminum-framed section fully glazed with 6-mm-thick, clear acrylic glazing set in vinyl, rubber, or neoprene glazing channel and with removable extruded-vinyl or aluminum stops.

2.2 TRACKS, SUPPORTS, AND ACCESSORIES

A. Tracks: Manufacturer's standard, galvanized-steel track system of configuration indicated, sized for door size and weight, designed for lift type indicated and clearances shown on Drawings. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slot vertical sections of track spaced 2 inches apart for door-drop safety device. Slope tracks at proper angle from vertical or design tracks to ensure tight closure at jambs when door unit is closed.

B. Track Reinforcement and Supports: Galvanized-steel track reinforcement and support members. Secure, reinforce, and support tracks as required for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors.

C. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of sectional door unless otherwise indicated.

D. Windows: Manufacturer's standard window units of type and size indicated and in arrangement shown. Provide removable stops of same material as door-section frames.

2.3 HARDWARE

A. General: Provide heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.

B. Hinges: Heavy-duty, galvanized-steel hinges at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails.

C. Rollers: Heavy-duty rollers with steel ball-bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Provide 3-inch- diameter roller tires for 3-inch- wide track and 2-inch- diameter roller tires for 2-inch- (51-mm-) wide track.

D. Push/Pull Handles: For push-up or emergency-operated doors, provide galvanized-steel lifting handles on each side of door.

2.4 LOCKING DEVICES

A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on single-jamb side, operable from inside only.

B. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded deadbolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

1. Lock Cylinders: Provide cylinders standard with manufacturer and keyed to building keying system.
2. Keys: Three for each cylinder.

C. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.5 COUNTERBALANCE MECHANISM

A. Torsion Spring: Counterbalance mechanism consisting of adjustable-tension torsion springs mounted on torsion shaft made of steel tube or solid steel. Provide springs designed for number of operation cycles indicated.

B. Cable Drums and Shaft for Doors: Cast-aluminum or gray-iron casting cable drums mounted on torsion shaft and grooved to receive door-lifting cables as door is raised. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of torsion shaft.

C. Cables: Galvanized-steel lifting cables.

D. Cable Safety Device: Include, on each side-edge of door, a device designed to automatically stop door if either lifting cable breaks.

E. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level the shaft and prevent sag.

F. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

2.6 ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and "operation cycles" requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

1. Comply with NFPA 70.
2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6; with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc.

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

C. Door-Operator Type: Unit of type indicated, consisting of electric motor, gears, pulleys, belts, sprockets, chains, and controls needed to operate door and meet required usage classification.

D. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Division 11 Section "Common Motor Requirements for Equipment" unless otherwise indicated.

1. Electrical Characteristics:

   a. Phase: Single phase.
   b. Volts: 115, 208 V.
   c. Hertz: 60.

2. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
3. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
4. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.

E. Obstruction Detection Device: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.

1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction. Provide self-monitoring capability designed to interface with door-operator control circuit to detect damage to or disconnection of sensor device.
2. Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable. Provide self-monitoring capability designed to interface with door-operator control circuit to detect damage to or disconnection of sensor device.

F. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."

1. Interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
2. Exterior units, full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.

G. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf.

H. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

I. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

J. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with regulatory requirements for accessibility.

2.7 DOOR ASSEMBLY

A. Full-Vision Aluminum Sectional Door: Sectional door formed with hinged sections.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Amarr Garage Doors.
b. Arm-R-Lite.
c. C.H.I. Overhead Doors.
d. Clopay Building Products; a Griffon company.
e. Fimbel Architectural Door Specialties.
f. General American Door Company.
g. Haas Door; a Nofziger company.
h. Martin Door Manufacturing.
i. Overhead Door Corporation.
j. Raynor.
k. Rite-Hite Corporation.
l. Wayne-Dalton Corp.
m. Windsor Republic Doors.

B. Operation Cycles: Not less than 20,000.

C. Aluminum Sections: Full vision with manufacturer's standard, nonglazed panels across bottom section of door.

D. Track Configuration: As Indicated..

E. Weatherseals: Fitted to bottom and top and around entire perimeter of door. Provide combination bottom weatherseal and sensor edge.

F. Windows: Sized and spacing as indicated on Drawings; installed with insulated glazing of the following type.

G. Locking Devices: Equip door with locking device assembly.

1. Locking Device Assembly: Cremone type, both jamb sides, locking bars, operable from outside with cylinder, with cylinder inside and outside, with cylinders.

H. Electric Door Operator:

1. Usage Classification: Medium duty, up to 15 cycles per hour.
2. Operator Type: Jackshaft, side mounted.
3. Motor Exposure: Interior, clean, and dry.
4. Emergency Manual Operation: Push-up type.
5. Obstruction-Detection Device: Automatic photoelectric sensor.
6. Other Equipment: Audible and visual signals.

I. Door Finish:
1. Baked-Enamel or Powder-Coated Finish: Color and gloss as selected by Architect from manufacturer's full range.
2. Finish of Interior Facing Material: Finish as selected by Architect from manufacturer's full range**.**

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Tracks: Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment. Repair galvanized coating on tracks according to ASTM A 780.

C. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion. Adjust doors and seals to provide weathertight fit around entire perimeter.

3.2 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional doors.

END OF SECTION 083613

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior storefront framing.
2. Storefront framing for window walls.
3. Storefront framing for punched openings.
4. Exterior manual-swing entrance doors and door frame units.

1.2 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:

1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
2. Dimensional tolerances of building frame and other adjacent construction.
3. Failure includes the following:

    a. Deflection exceeding specified limits.
    b. Thermal stresses transferring to building structure.
    c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
    d. Noise or vibration created by wind and by thermal and structural movements.
    e. Loosening or weakening of fasteners, attachments, and other components.
    f. Failure of operating units.

B. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Wind Loads: As indicated on Drawings.

D. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to [edge of glass in a direction perpendicular to glass plane shall not exceed L/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch, whichever is smaller.

E. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:

1. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
2. Test Durations: 10 seconds.

F. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft.

G. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.

1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.

C. Samples: For each type of exposed finish required.

D. Other Action Submittals:

1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams.

E. Delegated-Design Submittal: For aluminum-framed systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

F. Product test reports.

G. Field quality-control reports.

H. Maintenance data.

I. Warranties: Sample of special warranties.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

C. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.

D. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

E. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

F. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.

G. Preinstallation Conference: Conduct conference at Project site.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.

1. Warranty Period 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide manufacturer's name; product name or designation or comparable product by one of the following:

1. Arcadia, Inc.
2. Arch Aluminum & Glass Co., Inc.
3. CMI Architectural.
4. Commercial Architectural Products, Inc.
5. EFCO Corporation.
6. Kawneer North America; an Alcoa company.
7. Leed Himmel Industries, Inc.
8. Pittco Architectural Metals, Inc.
9. TRACO.
10. Tubelite.
11. United States Aluminum.
12. Vistawall Architectural Products; The Vistawall Group; a Bluescope Steel company.
13. YKK AP America Inc.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209.
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Structural Profiles: ASTM B 308/B 308M.
5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.3 FRAMING SYSTEMS

A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally improved.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Center.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads**,** finished to match framing system.

D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts, complying with ASTM A 123/A 123M or ASTM A 153/A 153M.

E. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

F. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.

1. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 GLAZING SYSTEMS

A. Glazing: As specified in Division 08 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

2.5 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.

1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

2. Door Design: Medium stile**;** 3-1/2-inch (88.9-mm) nominal width.

a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.

3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.

a. Provide nonremovable glazing stops on outside of door.

B. Entrance Door Hardware: As specified in Division 08 Section "Door Hardware."

2.6 ENTRANCE DOOR HARDWARE

A. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule and entrance door hardware sets indicated in "Entrance Door Hardware Sets" Article for each entrance door to comply with requirements in this Section.

1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products complying with BHMA standard referenced.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
3. Opening-Force Requirements:

a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf. to set the door in motion and not more than 15 lbf to open the door to its minimum required width.
b. Accessible Interior Doors: Not more than 5 lbf to fully open door.

B. Opening-Force Requirements:

1. Delayed-Egress Locks: Lock releases within 15 seconds after applying a force of not more than 15 lbf for not more than 3 seconds.
2. Latches and Exit Devices: Not more than 15 lbf required to release latch.

C. Butt Hinges: BHMA A156.1, Grade 1, radius corner.

1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
2. Exterior Hinges: Stainless steel, with stainless-steel pin.
3. Quantities:

a. For doors up to 87 inches high, provide 3 hinges per leaf.
b. For doors more than 87 and up to 120 high, provide 4 hinges per leaf.

D. Continuous-Gear Hinges: Manufacturer's standard with stainless-steel bearings between knuckles, fabricated to full height of door and frame.

E. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.

F. Manual Flush Bolts: BHMA A156.16, Grade 1.

G. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1.

H. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

I. Cylinders: BHMA A156.5, Grade 1.

1. Keying: Master key system. Permanently inscribe each key with a visual key control number and include notation "DO NOT DUPLICATE" to be furnished by Owner.

J. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

K. Operating Trim: BHMA A156.6.

L. Removable Mullions: BHMA A156.3, extruded aluminum.

1. When used with panic exit devices, provide removable mullions listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305. Use only mullions that have been tested with exit devices to be used.

M. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to meet field conditions and requirements for opening force.

N. Concealed Overhead Holders: BHMA A156.8, Grade 1.

O. Surface-Mounted Holders: BHMA A156.16, Grade 1.

P. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.

Q. Weather Stripping: Manufacturer's standard replaceable components.

R. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

S. Silencers: BHMA A156.16, Grade 1.

T. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.

U. Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

2.7 ACCESSORY MATERIALS

A. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil thickness per coat.

2.8 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from exterior and interior.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 ALUMINUM FINISHES

A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

1. Color: As selected by Architect from full range of industry colors and color densities.

B. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.

4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
6. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Install glazing as specified in Division 08 Section "Glazing."

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.2 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections.

B. Repair or remove work if test results and inspections indicate that it does not comply with specified requirements.

C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

D. Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.3 ENTRANCE DOOR HARDWARE

A. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door to comply with requirements in this Section.

1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated and named manufacturers' products.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
3. Opening-Force Requirements:

a. Egress Doors: Not more than 15 lbf (67 N) to release the latch and not more than 30 lbf (133 N) to set the door in motion and not more than 15 lbf (67 N) to open the door to its minimum required width.
b. Accessible Interior Doors: Not more than 5 lbf (22.2 N) to fully open door.

B. Opening-Force Requirements:

1. Delayed-Egress Locks: Lock releases within 15 seconds after applying a force of not more than 5 lbf (67 N) for not more than 3 seconds.
2. Latches and Exit Devices: Not more than 15 lbf (67 N) required to release latch.

C. Pivot Hinges: BHMA A156.4, Grade 1.

1. Offset-Pivot Hinges: Provide top, bottom, and intermediate offset pivots at each door leaf.

D. Butt Hinges: BHMA A156.1, Grade 1, radius corner.

1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
2. Exterior Hinges: Stainless steel, with stainless-steel pin.
3. Quantities:

a. For doors up to 87 inches (2210 mm) high, provide 3 hinges per leaf.
b. For doors more than 87 and up to 120 inches (2210 and up to 3048 mm) high, provide 4 hinges per leaf.

E. Continuous-Gear Hinges: Manufacturer's standard with stainless-steel bearings between knuckles, fabricated to full height of door and frame.

F. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.

G. Manual Flush Bolts: BHMA A156.16, Grade 1.

H. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1.

I. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

J. Cylinders: As specified in Division 08 Section "Door Hardware."

1. Keying: Master key system. Permanently inscribe each key with a visual key control number and include notation "DO NOT DUPLICATE".

K. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

L. Operating Trim: BHMA A156.6.

M. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to meet field conditions and requirements for opening force.

N. Concealed Overhead Holders: BHMA A156.8, Grade 1.

O. Surface-Mounted Holders: BHMA A156.16, Grade 1.

P. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.

Q. Weather Stripping: Manufacturer's standard replaceable components.

R. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

S. Silencers: BHMA A156.16, Grade 1.

T. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch (13 mm).

3.4 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.

6. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or metal panels.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

END OF SECTION 084113

SECTION 085113 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes fixed aluminum-framed windows.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified, and that are of minimum test size required by AAMA/WDMA 101/I.S.2/NAFS.

B. Structural Performance: Provide aluminum windows capable of withstanding the effects of the following loads, based on testing units representative of those indicated for Project that pass AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Structural Test:

1. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.

    a. Basic Wind Speed: 95 mph (38 m/s).
    b. Importance Factor: 1.15.
    c. Exposure Category: C.

2. Deflection: Design glass framing system to limit lateral deflections of glass edges to less than 1/175 of glass-edge length or 3/4 inch, whichever is less, at design pressure based on testing performed according to AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Deflection Test or structural computations.

C. Windborne-Debris Resistance: Provide glazed windows capable of resisting impact from windborne debris, based on the pass/fail criteria as determined from testing glazed windows identical to those specified, according to ASTM E 1886 and testing information in ASTM E 1996, AAMA 506 and requirements of authorities having jurisdiction.

D. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F material surfaces.

1.3 SUBMITTALS

A. Product Data: For each type of aluminum window indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, and installation details

C. Samples: For each exposed finish.

D. Product Schedule: Use same designations indicated on Drawings.

E. Field quality-control test reports.

F. Product test reports.

G. Maintenance data.

1.4 QUALITY ASSURANCE

A. Installer: A qualified installer, approved by manufacturer to install manufacturer's products.

B. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.

C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

D. Preinstallation Conference: Conduct conference at Project site.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to meet performance requirements.
b. Structural failures including excessive deflection, water leakage, air infiltration, or condensation.
c. Faulty operation of movable sash and hardware.
d. Deterioration of metals, other materials, and metal finishes beyond normal weathering.
e. Failure of insulating glass.

2. Warranty Period:

a. Window: Three years from date of Substantial Completion.
b. Glazing: 10 years from date of Substantial Completion.
c. Metal Finish: 15 years from date of Substantial Completion.

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:

C. Basis-of-Design Product: Subject to compliance with requirements, provide Insert manufacturer's name; product name or designation or a comparable product by one of the following:

1. All Seasons Windows & Doors; All Seasons Commercial Division, Inc.
2. Boyd Aluminum Manufacturing.
3. Custom Window Company.
4. DeSCo Windows.
5. EFCO Corporation.
6. EXTECH Exterior Technologies, Inc.
7. Fleetwood Aluminum Products, Inc.
8. Gerkin Windows and Doors.
9. Graham Architectural Products Corp.
10. Kawneer; an Alcoa Company.
11. Mannix; a division of Interstate Window Corp.
12. Peerless Products Inc.
13. Thermal Windows, Inc.
14. TRACO.
15. Wausau Window and Wall Systems.
16. Winco Window Company.
17. Window Technologies, Inc.; Century Manufacturing, Inc.
18. YKK AP America Inc.

2.2 WINDOW

A. Window Type: Fixed as indicated on Drawings.

B. Comply with AAMA/WDMA 101/I.S.2/NAFS.
1. Performance Class and Grade: C 30.
2. Performance Class and Grade: AW 40.

C. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of 45.

D. Thermal Transmittance: Provide aluminum windows with a whole-window, U-factor maximum indicated at 15-mph exterior wind velocity and winter condition temperatures when tested according to AAMA 1503.

1. U-Factor: 0.35 Btu/sq. ft. x h x deg F or less.

E. Solar Heat-Gain Coefficient (SHGC): Provide aluminum windows with a whole-window SHGC maximum of 0.40, determined according to NFRC 200 procedures.

2.3 GLAZING

A. Glass and Glazing Materials: Refer to Division 08 Section "Glazing" for glass units and glazing requirements applicable to glazed aluminum window units.

B. Glass Clear, insulating-glass units, argon gas filled, with low-E coating pyrolytic on second surface or sputtered on second or third surface complying with Division 08 Section "Glazing."

C. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal and complies with requirements for windborne-debris resistance.

2.4 FABRICATION

A. Fabricate aluminum windows that are reglazable without dismantling sash or ventilator framing.

B. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator.

C. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.

D. Provide water-shed members above side-hinged ventilators and similar lines of natural water penetration.

E. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.

F. Subframes: Provide subframes with anchors for window units as shown, of profile and dimensions indicated but not less than 0.062-inch thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Finish to match window units. Provide subframes capable of withstanding design loads of window units.

G. Glazing Stops: Provide snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.

2.5 ALUMINUM FINISHES

A. Aluminum Anodic Finish: Class I, clear anodic coating complying with AAMA 611.

1. Color: As selected by Architect from full range of industry colors and color densities.

B. Baked-Enamel Finish: Thermosetting, modified-acrylic or polyester enamel primer/topcoat system complying with AAMA 2604 except with a minimum dry film thickness of 1.5 mils, medium gloss.

1. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.

D. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

F. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

G. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

H. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

I. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

3.2 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.

1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing Services: Testing and inspecting of installed windows shall take place as follows:

1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502, Test Method A, by applying same test pressures required to determine compliance with AAMA/WDMA 101/I.S.2/NAFS in Part 1 "Performance Requirements" Article.

2. Testing Extent: Three mockup windows as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested immediately after installation.
3. Test Reports: Shall be prepared according to AAMA 502.

C. Remove and replace noncomplying aluminum window and retest as specified above.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION 085113

SECTION 086200 - UNIT SKYLIGHTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Unit skylights mounted on prefabricated curbs.

1.2 PERFORMANCE REQUIREMENTS

A. AAMA/WDMA Performance Requirements: Provide unit skylights of performance class and grade indicated that comply with AAMA/WDMA 101/I.S.2/NAFS, and ICC-EF Report ESR-3526.

1.3 SUBMITTALS

A. Product Data: For each type of unit skylight indicated.

B. Shop Drawings: For unit skylight work. Include plans, elevations, sections, details, and connections to supporting structure and other adjoining work.

C. Samples for Verification: For each type of exposed finish required, in a representative section of each unit skylight in manufacturer's standard size.

D. Product Schedule: For unit skylights. Use same designations indicated on Drawings.

E. Qualification data.

F. Product test reports.

G. Field quality-control reports.

H. Maintenance data.

I. Sample warranty.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating unit skylights that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.

B. Installer Qualifications: An installer acceptable to unit skylight manufacturer for installation of units required for this Project.

C. Unit Skylight Standard: Comply with AAMA/WDMA 101/I.S.2/NAFS, "North American Fenestration Standard Voluntary Performance Specification for Windows, Skylights and Glass Doors," for minimum standards of performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of unit skylights that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements**,** product name or designation or comparable product by the following:

1. WASCO PRODUCTS, INC., 85 Spencer Drive, Unit A, Wells, Maine 04090.

2.2 MATERIALS

A. Aluminum Components:

1. Sheets: ASTM B 209, alloy and temper to suit forming operations and finish requirements but with not less than the strength and durability of alclad Alloy 3005-H25.
2. Extruded Shapes: ASTM B 221, alloy and temper to suit structural and finish requirements but with not less than the strength and durability of Alloy 6063-T52.

B. Fasteners: Same metal as metal being fastened, nonmagnetic stainless steel, or other noncorrosive metal as recommended by manufacturer. Finish exposed fasteners to match material being fastened.

2.3 GLAZING

A. Glazing: Clear insulated glass.

1. Double-Glazing Profile: Flat.

a. Thicknesses: 1” or not less than thicknesses required to meet or exceed performance requirements.

b. Outer Glazing ¼" tempered glass.
c. Inner Glazing 7/16" high strength laminated glass.

B. Glazing Gaskets: Manufacturer's standard.

2.4 INSTALLATION MATERIALS

A. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic, nominally free of sulfur and containing no asbestos fibers, formulated for 15-mil dry film thickness per coating.

B. Joint Sealants: As specified in Division 07 Section "Joint Sealants."

C. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.

D. Roofing Cement: ASTM D 4586, asbestos free, designed for trowel application or other adhesive compatible with roofing system.

2.5 UNIT SKYLIGHTS

A. General: Provide factory-assembled unit skylights that include glazing, extruded-aluminum glazing retainers, gaskets, and inner frames and that are capable of withstanding performance requirements indicated.

B. Integral Curb: Extruded-aluminum, self-flashing type.

1. Height: 8 inches minimum.
2. Construction: Double wall.
3. Insulation: Manufacturer's standard rigid or semi-rigid type.

C. Condensation Control: Fabricate unit skylights with integral internal gutters and nonclogging weeps to collect and drain condensation to the exterior.

2.6 ALUMINUM FINISHES

A. Mill Finish: Manufacturer's standard.

B. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordinate installation of unit skylight with installation of substrates, vapor retarders, roof insulation, roofing membrane, and flashing as required to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight.

B. Comply with recommendations in AAMA 1607 and with manufacturer's written instructions for installing unit skylights.

3.2 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. After completion of installation and nominal curing of sealant and glazing compounds but before installation of interior finishes, test for water leaks according to AAMA 501.2.

C. Perform test for total area of each unit skylight.

D. Work will be considered defective if it does not pass tests and inspections.

E. Additional testing and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.3 CLEANING

A. Clean exposed unit skylight surfaces according to manufacturer's written instructions.

END OF SECTION 086200

SECTION 08625 - TUBULAR DAYLIGHTING DEVICE

PART 1 – GENERAL

1.1 SUMMARY

A. Tubular daylighting device, consisting of roof dome, reflective tube, and diffuser assembly; configuration as indicated on the drawings.

B. Accessories.

1.2 RELATED SECTIONS

A. Section 075419 – Polyvinyl-Chloride (Pvc) Roofing: Flashing of skylight base.

B. Section 076200 – Sheet Metal Flashing and Trim: Metal flashings.

C. Section 086200 - Unit Skylights: Skylights without reflective tube.

D. Section 260000 – General Electrical Provisions: Electrical connections.

1.3 REFERENCES

A. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

B. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2008a.

C. ASTM A 463/A 463M - Standard Specification for Steel Sheet, Aluminum Coated, by the Hot Dip Process; 2006.

D. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized), by the Hot Dip Process; 2007.

E. ASTM E 283 - Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004.

F. ASTM E 308 - Standard Practice for Computing the Colors of Objects by Using the CIE System; 2006.

G. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls and Doors; 2002.

H. ASTM E 547 - Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain walls by Cyclic Air Pressure Difference; 2000.

I. ASTM E 1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.

J. ASTM E 1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricane.

K. ASTM D 635 - Test Method for Rate of Burning and/or Extent of Time of Burning of Self-Supporting Plastics in a Horizontal Position; 2006.

L. ASTM D-1929 - Test Method for Ignition Properties of Plastics; 1996 (2001).

M. UL 181 - Factory Made Air Ducts and Air Connectors

N. ICC AC-16 - Acceptance Criteria for Plastic Skylights; 2008.

O. Florida Building Code TAS 201 – Impact Test Procedures.

P. Florida Building Code TAS 202 – Criteria for Testing Impact and Non Impact Resistant Building Envelope Components Using Uniform Static Air Pressure Loading.

Q. Florida Building Code TAS 203 – Criteria for Testing Products Subject to Cyclic Wind Pressure Loading

1.4 PERFORMANCE REQUIREMENTS

A. Completed tubular daylighting device assemblies shall be capable of meeting the following performance requirements:
   1. Air Infiltration Test: Air infiltration will not exceed 0.30 cfm/sf aperture with a pressure delta of 1.57 psf across the tube when tested in accordance with ASTM E 283.
   2. Water Resistance Test: No uncontrolled water leakage at 10.5 psf pressure differential with water rate of 5 gallons/hour/sf when tested in accordance with ASTM E 547.
   3. Uniform Load Test:
      a. No breakage, permanent damage to fasteners, hardware parts, or damage to make daylighting system inoperable or cause excessive permanent deflection of any section when tested at a Positive Load of 150 psf (7.18 kPa) or Negative Load of 70 psf (3.35 kPa).
      b. All units shall be tested with a safety factor of (3) for positive pressure and (2) for negative pressure, acting normal to plane of roof in accordance with ASTM E 330.
   4. Fire Testing:
      a. When used with the Dome Edge Protection Band, all domes meet fire rating requirements as described in the 2006 International Building Code.
      b. Self-Ignition Temperature - Greater than 650 degrees F per ASTM D-1929.
      c. Smoke Density - Rating no greater than 450 per ASTM Standard E 84 in way intended for use. Classification C.
      d. Rate of Burn and/or Extent - Maximum Burning Rate: 2.5 inches/min (62 mm/min) Classification CC-2 per ASTM D 635.
      e. Rate of Burn and/or Extent - Maximum Burn Extent: 1 inch (25 mm) Classification CC-1 per ASTM D 635.

1.5 SUBMITTALS

A. Submit under provisions of Section 013300.

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. Shop Drawings. Submit shop drawings showing layout, profiles and product components, including anchorage, flashings and accessories.

D. Verification Samples: As requested by Architect.

E. Test Reports: Independent testing agency or evaluation service reports verifying compliance with specified performance requirements.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Experienced in manufacture of tubular daylighting devices.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

A. Daylighting Device: Manufacturer's standard warranty for 10 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Solatube International, Inc., which is located at: 2210 Oak Ridge Way ; Vista, CA 92081; Toll Free Tel: 888-765-2882; Tel: 760-477-1120; Email: request info (commsales@solatube.com); Web: www.solatube.com

B. Requests for substitutions will be considered in accordance with provisions of Section 016000.

2.2 TUBULAR DAYLIGHTING DEVICES

A. Tubular Daylighting Devices General: Transparent roof-mounted skylight dome and self-flashing curb, reflective tube, and ceiling level diffuser assembly, transferring sunlight to interior spaces; complying with ICC AC-16.

B. SolaMaster Series: Solatube Model 750 DS-C Penetrating Ceiling, 21-inch (530 mm) Daylighting System:
1. Roof Dome Assembly: Transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.

a. Outer Dome Glazing: Type DA, 0.125 inch (3.2 mm) minimum thickness injection molded acrylic classified as CC2 material; UV inhibiting (100 percent UV C, 100 percent UV B and 98.5 percent UV C), impact modified acrylic blend.
b. Raybender 3000: Variable prism optic molded into outer dome to capture low angle sunlight and limit high angle sunlight.
c. Inner Dome Glazing: Type DAI, 0.115 inch (3 mm) minimum thickness acrylic classified as CC2 material.
d. Bottom Layer: ¼" tempered glass.

2. Roof Flashing Base:
   a. One Piece: One piece, seamless, leak-proof flashing functioning as base support for dome and top of tube. Sheet steel, corrosion resistant conforming to ASTM A 653/A 653M or ASTM A 463/A 463M, 0.028 inch (0.7 mm) thick.
      1) Base Style: Type F11, Self mounted, 11 inches (279 mm) high.
3. Tube Ring: Attached to top of base section; 0.090 inch (2.3 mm) nominal thickness injection molded high impact PVC; to prevent thermal bridging between base flashing and tubing and channel condensed moisture out of tubing.
4. Dome Seal: Adhesive backed weatherstrip 0.63 inch (16 mm) tall by 0.28 inch (7 mm).
5. Diffuser Assemblies for Tubes Penetrating Ceilings: Solatube Model 750 DS-C. Ceiling mounted box transitioning from round tube to square ceiling assembly, supporting light transmitting surface at bottom termination of tube; 23.8 inches by 23.8 inches (605 mm by 605 mm) square frame to fit standard suspended ceiling grids or hard ceilings.
   a. Round to square transition box made of opaque polymeric material, classified as CC2, Class C, 0.110 inch (2.8 mm) thick.
   b. Lens: Type L1 OptiView Fresnel lens design to maximize light output and diffusion with extruded aluminum frame and EPDM foam seal to minimize condensation and bug, dirt and air infiltration per ASTM E 283. Visible Light Transmission shall be greater than 90 percent at 0.022 inch (0.6 mm) thick. Classified as CC2.
   c. Supplemental Natural Effect Lens made of acrylic, classified as CC2, Class C, 0.060 inch (1.5 mm) thick, with open cell foam seal to minimize condensation and bug, dirt and air infiltration per ASTM E 283.
6. Accessories:
   a. Security Bar: Type B Security Bar 0.375 inch (95 mm) stainless steel bar across flashing diameter opening.
   b. Wire Suspension Kit: Type E, Use the wire suspension kit when additional bracing to the structure is required.
   c. Local Dimmer Control utilizing a butterfly baffle design of Spectralight Infinity reflective material to minimize shadowing when in use: Provided with dimmer switch and cable.
      1) Daylight Dimmer: Type D Electro-mechanically actuated daylight valve; for universal input voltages ranging between 90 and 277 V at 50 or 60 Hz; maximum current draw of 50 ma per unit; controlled by low voltage, series Type T02: circuited, 4 conductor, size 22 cable; providing daylight output between 2 and 100 percent. Provided with dimmer switch and cable.
      2) Switch: Type SW, Manufacturer-specific low voltage DC DP/DT switch (white) required to operate Daylight Dimmer. Note: only one switch is

required per set of synchronously controlled dimmers.

3) Cable: Type CA, Two conductor low voltage cable (500 foot) for multiple unit DC connection.

7. Catalog Number: S750 DS-C-DAI-B-SK-F11-E-L1-LN-D-SW-CA

2.3 ACCESSORIES

A. Fasteners: Same material as metals being fastened, non-magnetic steel, non-corrosive metal of type recommended by manufacturer, or injection molded nylon.

B. Suspension Wire: Steel, annealed, galvanized finish, size and type for application and ceiling system requirement.

C. Sealant: Polyurethane or copolymer based elastomeric sealant as provided or recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's printed instructions.

B. After installation of first unit, field test to determine adequacy of installation. Conduct water test in presence of Owner, Architect, or Contractor, or their designated representative. Correct if needed before proceeding with installation of subsequent units.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 086250

SECTION 08 7100

DOOR HARDWARE

PART 1 -GENERAL

1.1 SUMMARY

A. Section Includes:

Cylinders for doors fabricated with locking hardware.

B. Related Sections:

Comply with 2015 Standard Specifications for Public Works Construction 'The GREENBOOK' and 2015 City Supplement 'The WHITEBOOK', Section 2-11 for Inspections.

Section 06 20 00 - Finish Carpentry: Finish Hardware Installation

Section 07 90 05 - Joint Sealers – exterior thresholds

Section 08 14 00 - Wood Doors

C. Specific Omissions: Hardware for the following is specified or indicated elsewhere.

Windows.

Cabinets, including open wall shelving and locks.

Signs, except where scheduled.

Toilet accessories, including grab bars.

Installation.

Rough hardware.

Conduit, junction boxes & wiring.

Folding partitions, except cylinders where detailed.

Sliding aluminum doors, except cylinders where detailed.

Access doors and panels, except cylinders where detailed.

Corner Guards.

Wrought Iron railing gates and supports.

1.2 REFERENCES:

Use date of standard in effect as of Bid date.

American National Standards Institute – ANSI 156.18 – Materials and Finishes.

BHMA – Builders Hardware Manufacturers Association

DHI – Door and Hardware Institute

NFPA – National Fire Protection Association

1. NFPA 80 – Fire Doors and Windows
2. NFPA 105 – Smoke and Draft Control Door Assemblies
3. NFPA 252 – Fire Tests of Door Assemblies
4. NFPA 101 – Life Safety Code

UL – Underwriters Laboratories

5. UL10C – Positive Pressure Fire Tests of Door Assemblies.
6. UL 305 – Panic Hardware

WHI – Warnock Hersey Incorporated

2013 State of California Building Code

Local applicable codes

SDI – Steel Door Institute

WI – Woodwork Institute

AWI – Architectural Woodwork Institute

NAAMM – National Association of Architectural Metal Manufacturers

1.3 SUBMITTALS & SUBSTITUTIONS

SUBMITTALS: Comply with Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, Section 2-5.3 for Shop Drawings and Submittals. Only submittals printed one sided will be accepted and reviewed. Organize vertically formatted schedule into "Hardware Sets" with index of doors and headings, indicating complete designations of every item required for each door or opening. Include following information:

1. Type, style, function, size, quantity and finish of hardware items.
2. Use BHMA Finish codes per ANSI A156.18.
3. Name, part number and manufacturer of each item.
4. Fastenings and other pertinent information.
5. Description of door location using space names and numbers as published in the drawings.
6. Explanation of abbreviations, symbols, and codes contained in schedule.
7. Mounting locations for hardware.
8. Door and frame sizes, handing, materials, fire-rating and degrees of swing.
9. List of manufacturers used and their nearest representative with address and phone number.
10. Catalog cuts.
11. Wiring Diagrams.

Manufacturer's technical data and installation instructions for electronic hardware.

Date of jobsite visit.

Bid and submit manufacturer's updated/improved item if scheduled item is discontinued.

Deviations: Highlight, encircle or otherwise identify deviations from "Schedule of Finish Hardware" on submittal with notations clearly designating those portions as deviating from this section.

If discrepancy between drawings and scheduled material in this section, bid the more expensive of the two choices, note the discrepancy in the submittal and request direction from Engineer for resolution.

Substitutions. Comply with Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, Section 4-1.6 for Substitutions. Include product data and indicate benefit to the Project. Furnish operating samples on request.

Furnish as-built/as-installed schedule with closeout documents, including keying schedule, wiring diagrams, manufacturers' installation, adjustment and maintenance information, and supplier's final inspection report.

1.4 QUALITY ASSURANCE:

Qualifications:

1. Hardware supplier: direct factory contract supplier who employs a certified architectural hardware consultant (AHC), available at reasonable times during course of work for project hardware consultation to City, Engineer and Contractor.

    a) Responsible for detailing, scheduling and ordering of finish hardware. Detailing implies that the submitted schedule of hardware is correct and complete for the intended function and performance of the openings.

Hardware: Free of defects, blemishes and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges and closers) from one manufacturer.

Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

Fire-Rated Openings: NFPA 80 compliant. Hardware UL10C / California State Fire Marshal Standard 12-7-4 (positive pressure) compliant for given type/size opening and degree of label. Provide proper latching hardware, non-flaming door closers, approved-bearing hinges, and resilient seals. Coordinate with wood door section for required intumescent seals. Furnish openings complete.

2. Note: scheduled resilient seals may exceed selected door manufacturer's requirements.

3. See 2.6.E for added information regarding resilient and intumescent seals.

Furnish hardware items required to complete the work in accordance with specified performance level and design intent, complying with manufacturers' instructions.

1.5 DELIVERY, STORAGE AND HANDLING:

Delivery: coordinate delivery to appropriate locations (shop or field).

1. Permanent keys and cores: secured delivery direct to Engineer.

Acceptance at Site: Items individually packaged in manufacturers' original containers, complete with proper fasteners and related pieces. Clearly mark packages to indicate contents, locations in hardware schedule and door numbers.

Storage: Provide securely locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, dust, excessive heat and cold, etc.

1.6 PROJECT CONDITIONS AND COORDINATION:

Where exact types of hardware specified are not adaptable to finished shape or size of members requiring hardware, provide suitable types having as nearly as practical the same operation and quality as type specified, subject to Engineer's approval.

Coordination: Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents. Furnish related trades with the following information:

1. Location of embedded and attached items to concrete.
2. Location of wall-mounted hardware, including wall stops.
3. Location of finish floor materials and floor-mounted hardware.
4. Locations for conduit and raceways as needed for electrical, electronic and electro-pneumatic hardware items. Fire/life-safety system interfacing. Point-to-point wiring diagrams plus riser diagrams to related trades.
5. Manufacturer templates to door and frame fabricators.

Check Shop Drawings for doors and entrances to confirm that adequate provisions will be made for proper hardware installation. Do not order hardware until the submittal has been reviewed by the frame and door suppliers for compatibility with their products.

Prior to submittal, carefully inspect existing conditions at each opening to verify finish hardware required to complete Work, including sizes, quantities, existing hardware scheduled for re-use, door thickness and sill condition material. If conflict or incompatibility between the specified/scheduled hardware and existing conditions, submit request for direction from Engineer. Include date of jobsite visit in the submittal.

6. Submittals prepared without thorough jobsite visit by qualified hardware expert will be rejected as non-compliant.

1.7 WARRANTY:

A. Comply with 2015 Standard Specifications for Public Works Construction 'The GREENBOOK' and 2015 City Supplement 'The WHITEBOOK', Section 6-8.3 for Warranty

B. Special Warranty: Part of respective manufacturers' regular terms of sale. Provide manufacturers' written warranties:

1.	Locksets:	Three years
2.	Extra Heavy Duty Cylindrical Lock:	Seven Years
3.	Exit Devices	Three years mechanical One year electrical
4.	Closers:	Ten years mechanical Two years electrical
5.	Hinges:	One year
6.	Continuous Hinges	Life of the Installation
7.	Other Hardware	Two years

1.8 COMMISSIONING:

Conduct these tests prior to request for certificate of substantial completion:

1. With installer present, test door hardware operation with climate control system and stairwell pressurization system both at rest and while in full operation.
2. With installer, access control contractor and electrical contractor present, test electrical, electronic and electro-pneumatic hardware systems for satisfactory operation.
3. With installer and electrical contractor present, test hardware interfaced with fire/life-safety system for proper operation and release.

1.9 REGULATORY REQUIREMENTS:

A. Doors/doorways as part of an accessible route shall comply with CBC Sections 11B-404.

B. The clear opening width for a door shall be 32" minimum. For a swinging door it shall be measured between the face of the door and the stop, with the door open 90 degrees. There shall be no projections into it below 34" and 4" maximum projections into it between 34" and 80" above the finish floor or ground. Door closers and stops shall be permitted to be 78" minimum above the finish floor or ground. CBC Section 11B-404.2.3

C. Handles, pulls, latches, locks, and other operable parts on accessible doors shall comply with CBC Section 11B-309.4 and shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. Operable parts of such hardware shall be 34" minimum and 44" maximum above finish floor or ground. Where sliding doors are in the fully open position, operating hardware shall be exposed and usable from both side. CBC Section 11B-404.2.7

D. The force for pushing or pulling open a door shall be as follows: CBC Section 11-B404.2.9.

1. Interior hinged doors, sliding or folding doors, and exterior hinged doors: 5 pounds (22.2N) maximum.
2. Required fire doors: the minimum opening force allowable by the DSA authority, not to exceed 15 pounds (67N).
3. The force required to activate any operable parts, such as retracting latch bolts or disengaging other devices, shall be 5 pounds (22.2N) maximum to comply with CBC Section 11B-309.4.

E. Door closing speed shall be as follows: CBC Section 11B-404.2.8

1. Closer shall be adjusted so that the required time to move a door from an open position of 90 degrees to a position of 12 degrees from the latch is 5 seconds min.
2. Spring hinges shall be adjusted so that the required time to move a door from an open position of 70 degrees to the closed position is 1.5 seconds minimum.

F. Thresholds shall comply with CBC Section 11B-404.2.5

G. Floor stops shall not be located in the path of travel and 4" maximum from walls. DSA Policy 99-08.

H. Hardware (including panic hardware) shall not be provided with "Night Latch" (NL) function for accessible doors and gates unless the following conditions are met per DSA Interpretation 10-08 DSA/AC (External), revised 4/28/09. Such conditions must be clearly demonstrated and indicated in the specifications:

1. Such hardware has a 'dogging' feature.
2. It is dogged during the time the facility is open.
3. Such 'dogging' operation is performed only by employees as their job function (non-public use).

I. Pair of doors: limit swing of one leaf to 90 degrees so that a clear floor space is provided beyond the arc of the swing for the wall-mounted tactile sign. CBC Section 11B-703.4.2.1

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Listed acceptable alternate manufacturers: submit for review products with equivalent function and features of scheduled products.

ITEM:	MANUFACTURER:	ACCEPTABLE SUB:
Hinges	(McK) McKinney	Stanley
Continuous Hinge	(PEM) Pemko	Markar
Locksets	(BES) Best	Best
Exit Device	(PRE) Precision	None
Cylinders	(BES) Best	Owner Standard.
Closers	(LCN) LCN	Norton 7500
Silencers	(IVE) Ives	Trimco
Kickplates	(IVE) Ives	Trimco
Stops & Holders	(IVE) Ives	Trimco
Thresholds	(ZER) Zero	NGP
Seals & Bottoms	(ZER) Zero	NGP

2.2 HINGING METHODS:

Drawings typically depict doors at 90 degrees, doors will actually swing to maximum allowable. Use wide-throw conventional or continuous hinges as needed up to 8 inches in width to allow door to stand parallel to wall for true 180-degree opening. Advise Engineer if 8-inch width is insufficient.

Conform to manufacturer's published hinge selection standard for door dimensions, weight and frequency, and to hinge selection as scheduled. Where manufacturer's standard exceeds the scheduled product, furnish the heavier of the two choices, notify Engineer of deviation from scheduled hardware.

Conventional Hinges: Steel or stainless-steel pins and concealed bearings. Hinge open widths minimum, but of sufficient throw to permit maximum door swing.

1. Out swinging exterior doors: non-ferrous with non-removable (NRP) pins and security studs.
2. Non-ferrous material exteriors and at doors subject to corrosive atmospheric conditions.
3. bits.

2.3 LOCKSETS, LATCHSETS, DEADBOLTS:

A. Mortise Locksets and Latchsets: Best 45 Series, Trim as scheduled.

1. Chassis: cold-rolled steel, handing field-changeable without disassembly.
2. Latchbolts: 3/4 inch throw stainless steel anti-friction type.
3. Lever Trim: through-bolted, accessible design, cast lever or solid extruded bar type levers as scheduled. Filled hollow tube design unacceptable.
    a. Spindles: security design independent breakaway. Breakage of outside lever does not allow access to inside lever's hubworks to gain wrongful entry.
    b. Inside lever applied by screwless shank mounting – no exposed trim mount screws.
    c. Outside and inside trim thru-bolted together and through the door.
4. Spring-loaded fusible link provides fail secure mode in case of fire.
5. Floating mounting tabs automatically adjusts to fit a beveled door edge.
6. Field reversible handing without opening lock case.
7. External spring cages allow for simple trim retrofit.
8. Furnish solid cylinder collars with wave springs. Wall of collar to cover rim of mortise cylinder.
9. Thumbturns: accessible design not requiring pinching or twisting motions to operate.
10. Deadbolts: stainless steel 1-inch throw.
11. Electric operation: Manufacturer-installed continuous duty solenoid.
12. Strikes: 16 gage curved steel, bronze or brass with 1 inch deep box construction, lips of sufficient length to clear trim and protect clothing.
13. Certifications:
    1. ANSI A156.13, 1994, Grade 1 Operational, Grade 2 Security.
    2. ANSI/ASTM F476-84 Grade 31 UL Listed.
14. Comply with the CBC for the Exit Device requirement of 5 lbs force to retract the latch.

2.4 CYLINDERS

1. Best interchangeable core 1E74 x RP3 x cam required

2. Best 7 pin "Patented Peaks / Cormax".

3. Keyed to the existing Best master key system.

4. Provide all locksets and cylinders with construction cores for contractor use. Provide permanent cores at project completion.

5. Meet with the Owner for the keyway of record and to establish a keying schedule.

2.5 CLOSERS

Surface Closers:

1. Full rack-and-pinion type cylinder with removable full metal cover and cast iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.
2. ISO 2000 certified. Units stamped with date-of-manufacture code.
3. Independent lab-tested 10,000,000 cycles.
4. Non-sized, non-handed, and adjustable. Place closer inside building, stairs, and rooms.
5. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.
6. Adjustable to open with not more than 5.0lbs pressure to open at exterior doors and 5.0lbs at interior doors. As allowed per California Building Code, Section 11B-404.2.9, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15lbs.
7. When provided, the sweep period of the closer shall be adjusted to comply with California Building Code, Section 11B-404.2.8. Door closers and gate closers shall be adjusted so that from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum.
8. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.
9. Extra-duty arms (EDA) at exterior doors scheduled with parallel arm units.
10. Exterior door closers: tested to 100 hours of ASTM B117 salt spray test, furnish data on request.
11. Exterior doors: seasonal adjustments not required for temperatures from 120 degrees F to -30 degrees F, furnish checking fluid data on request.
12. Non-flaming fluid, will not fuel door or floor covering fires.
13. Pressure Relief Valves (PRV) not permitted.
14. Supply Special Rust Inhibitor (SRI) at corrosive environments. This special corrosion resistant pretreatment, when added to the powder coat finish, gives the closer a tremendous advantage over a potentially corrosive environment.

2.6 OTHER HARDWARE

Automatic Flush Bolts: Low operating force design.

Overhead Stops: Non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.

Kick Plates: Rounded and relieved edges, .050 inches minimum thickness, height and width as scheduled. Sheet-metal screws of bronze or stainless steel to match other hardware.

Door Stops: Provide stops to protect walls, casework or other hardware.

1. Unless otherwise noted in Hardware Sets, provide floor type with appropriate fasteners. Where floor type cannot be used, provide wall type. If neither can be used, provide overhead type.

2. Locate overhead stops for maximum possible opening. Consult with City for furniture locations. Minimum: 90deg stop / 95deg deadstop. Note degree of opening in submittal.

Seals: Finished to match adjacent frame color. Resilient seal material: polyurethane, polypropylene, nylon brush, silicone rubber or solid high-grade neoprene as scheduled. Do not furnish vinyl seal material. UL label applied to seals on rated doors. Substitute products: certify that the products equal or exceed specified material's thickness and durability.

Thresholds: As scheduled and per details. Comply with CBC Section 11B-404.2.5. Substitute products: certify that the products equal or exceed specified material's thickness. Proposed substitutions: Comply with Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, Section 4-1.6 for Substitutions.

3. Exteriors: Seal perimeter to exclude water and vermin. Use sealant complying with requirements in Division 7 "Thermal and Moisture Protection". Non-ferrous 1/4inch fasteners and lead expansion shield anchors, or Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors (SS/FHSL).

4. Flat saddle type thresholds shall have a minimum wall thickness of .125".

5. Fire-rated openings, 90min or less duration: use thresholds to interrupt floor covering material under the door where that material has a critical radiant flux value less than 0.22 watts per square centimeter, per NFPA 253. Use threshold unit as scheduled. If none scheduled, request direction from Architect.

6. Fire-rated openings, 3hour duration: Thresholds, where scheduled, to extend full jamb depth.

7. Acoustic openings: Set units in full bed of Division-7-compliant, leave no air space between threshold and substrate.

8. Plastic plugs with wood or sheet metal screws are not an acceptable substitute for specified fastening methods.

9. Fasteners: Generally, exposed screws to be Phillips or Robertson drive. Pinned TORX drive at high security areas. Flat head sleeve anchors (FHSL) may be slotted drive. Sheet metal and wood screws: full-thread. Sleeve nuts: full length to prevent door compression.

Exposed Through-Bolts: Do not use SNB, grommet nuts, sleeve nuts or other such clamping type fasteners, intent is for minimal exposed hardware. Coordinate with wood doors; ensure provision of proper blocking to support wood screws for mounting panic hardware and door closers. Coordinate with metal doors and frames; ensure provision of proper reinforcement to support machine screws for mounting panic hardware and door closers.

Silencers: Interior hollow metal frames, 3 for single doors, 2 for pairs of doors. Omit where adhesive mounted seal occurs. Leave no unfilled/uncovered pre-punched silencer holes.

2.7 FINISH:

Generally, BHMA 630 Satin Stainless

Door closers: factory powder coated to match other hardware, unless otherwise noted.

Aluminum items: match predominant adjacent material. Seals to coordinate with frame color.

2.8 KEYING REQUIREMENTS:

Key System: BEST 7 pin IC core System no substitute.

1. Furnish 10 construction keys.
2. Furnish 3 construction split control keys.
3. Key Cylinders: furnish 6-pin solid brass construction.

Cylinders/cores: keyed at factory of lock manufacturer where permanent records are maintained.

Permanent keys: use secured shipment direct from point of origination to the City.

4. For estimate: 4 keys per change combination. Provide 2 master keys per group, 2 grand-master keys, 2 control keys.
5. For estimate: VKC stamping plus “Do Not Duplicate”.

PART 3 - EXECUTION

3.1 ACCEPTABLE INSTALLERS:

Can read and understand manufacturers’ templates, suppliers’ hardware schedules and printed installation instructions. Can readily distinguish drywall screws from manufacturers’ furnished fasteners. Available to meet with manufacturers’ representatives and related trades to discuss installation of hardware.

3.2 PREPARATION:

Ensure that walls and frames are square and plumb before hardware installation. Make corrections before commencing hardware installation.

Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.

1. Notify Engineer of code conflicts before ordering material.
2. Locate levers, key cylinders, t-turn pieces, touchbars and other operable portions of latching hardware between 30 inches to 44 inches above the finished floor, per CBC Section 11B-404.2.7.
3. Where new hardware is to be installed near existing doors/hardware scheduled to remain, match locations of existing hardware.

Overhead stops: before installing, determine proposed locations of furniture items, fixtures, and other items to be protected by the overhead stop's action.

3.3 INSTALLATION

Install hardware per manufacturer’s instructions and recommendations. Do not install surface-mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation. Remove and reinstall or replace work deemed defective by Engineer.

1. Gaskets: install jamb-applied gaskets before closers, overhead stops, rim strikes, etc; fasten hardware over and through these seals. Install sweeps across bottoms of doors before astragals, cope sweeps around bottom pivots, trim astragals to tops of sweeps.
2. When hardware is to be attached to existing metal surface and insufficient reinforcement exists, use RivNuts, NutSerts or similar anchoring device for screws.

3. Use manufacturers' fasteners furnished with hardware items, or submit Request for Substitution with Engineer.

4. Replace fasteners damaged by power-driven tools.

Locate floor stops no more that 4 inches from walls and not within paths of travel. See paragraph 2.2 regarding hinge widths, door should be well clear of point of wall reveal. Point of door contact no closer to the hinge edge than half the door width. Where situation is questionable or difficult, contact Engineer for direction.

Core concrete for exterior door stop anchors. Set anchors in approved non-shrink grout.

Locate overhead stops for minimum 90 degrees and maximum allowable degree of swing.

Drill pilot holes for fasteners in wood doors and/or frames. Centerpunch hole locations before using self-drilling type screws to prevent skating. Replace screws that are not centered in their holes.

Lubricate and adjust existing hardware scheduled to remain. Carefully remove and give to City items not scheduled for reuse.

3.4. ADJUSTING

Adjust and check for proper operation and function. Replace units, which cannot be adjusted to operate freely and smoothly.

1. Hardware damaged by improper installation or adjustment methods: repair or replace to City's satisfaction.

2. Adjust doors to fully latch with no more than 1 pound of pressure.

3. Adjust delayed-action closers on fire-rated doors to fully close from fully-opened position in no more than 10 seconds.

4. Adjust door closers per 1.9 this section.

Final inspection: Installer to provide letter to City that upon completion installer has visited the Project and has accomplished the following:

5. Re-adjust hardware.

6. Evaluate maintenance procedures and recommend changes or additions, and instruct City's personnel.

7. Identify items that have deteriorated or failed.

8. Submit written report identifying problems

3.5 DEMONSTRATION:

Demonstrate mechanical hardware and electrical, electronic and pneumatic hardware systems, including adjustment and maintenance procedures.

Certification, Testing and Quality Control: Comply with 2015 Standard Specifications for Public Works Construction 'The GREENBOOK' and 2015 City Supplement 'The WHITEBOOK', Section 2-11 for Inspection. . All doors hardware and installation will be inspected by the Engineer.

3.6 PROTECTION/CLEANING:

Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion.

Clean adjacent wall, frame and door surfaces soiled from installation/reinstallation process.

Hardware items specified to receive antimicrobial coating may be cleaned with a mild detergent, air-dry or dried with a soft cloth. Avoid harsh abrasive cleaners and abrasive cleaning pads.

3.7 SCHEDULE OF FINISH HARDWARE

See door schedule in drawings for hardware set assignments.

Manufacturers and their abbreviations used in this schedule:

BES	Best Access Systems
IVE	Ives
LCN	LCN Closers
McK	McKinney
PRE	Precision
SCH	Schlage Lock Company
TRE	Trimco
VON	Von Duprin
ZER	Zero

Schedule Groups:

SpeXtra # 263835

Heading 001

1	PR	Door 100	EXTERIOR / LOBBY 100
1	PR	Door 101A	EXTERIOR / MEETING ROOM 101
1	PR	Door 101B	EXTERIOR / MEETING ROOM 101
1	PR	Door 117C	EXTERIOR / WORKSHOP 118

2/3' 0" X 7' 0" X 1 3/4" X ALD X ALF X NONRTD
JAMB AND HEAD SEALS BY THE DOOR/FRAME MANUFACTURER.

Each Assembly to have:

2	EA	CONT. HINGE	High Traffic	628	PEM
1	EA	KEYED REMOVABLE MULLION	KR4954	689	VON
1	EA	PANIC HARDWARE	2100 x 4900 Series	626	PRE
1	EA	PANIC HARDWARE	2100 x 4900 Series	626	PRE
3	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

JAMB AND HEAD SEALS BY THE DOOR/FRAME MANUFACTURER.

Mullion removable by key.
Free Egress at all times. Pressing Push Bar retracts latchbolts. No exterior trim. Dogging by key cylinder with visible security indicator locks down the pushbar or crossbar so the latchbolt remains retracted.
Free Egress at all times. Pressing Push Bar retracts latchbolts. Trim always locked, entrance by optional trim when key retracts latchbolt from pull side. Dogging by key cylinder with visible security indicator locks down the pushbar or crossbar so the latchbolt remains retracted.
Self-Closing. Templating allows Spring CUSH Arm to stop the door's swing between 85 and 110 degrees with hold-open feature. Delays closing from maximum opening to approximately 70 degrees. 1 minute maximum delay time.

Heading 002

1 SGL Door 101C LOBBY 100 / MEETING ROOM 101
3' 0" X 6' 8" X 1 3/4" X HMD X HMF X NONRTD

Each Assembly to have:

3	EA	HINGE	55860 TA 2714 4.5 X 4 NRP	US32D	McK
1	EA	PANIC HARDWARE	2100 Series	US32D/ 626	PRE
1	EA	MORTISE CYLINDER	1E64 C181 RP2	626	BES
1	EA	RIM CYLINDER	1E72 S2 RP3	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	GASKETING	188S-CL	S-Cl	ZER
1	EA	DOOR BOTTOM	350A6	A	ZER
1	EA	THRESHOLD	546A MSLA-10	AL	ZER

Free Egress at all times. Pressing Push Bar retracts latchbolts. Latchbolt retracted by lever unless locked by key. Key locks and unlocks lever. Dogging by key cylinder with visible security indicator locks down the pushbar or crossbar so the latchbolt remains retracted.
Self-Closing. Templating allows Spring CUSH Arm to stop the door's swing between 85 and 110 degrees with hold-open feature. Delays closing from maximum opening to approximately 70 degrees. 1 minute maximum delay time.

Heading 003

1 SGL Door 108 LOBBY 100 / VOLUNTEER AREA 106
3' 4" X 7' 0" X 1 3/4" X WD X HMF X NONRTD

Each Assembly to have:

3	EA	HINGE	55860 TA 2714 4.5 X 4 NRP	US32D	McK
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	THRESHOLD	546A MSLA-10	AL	ZER
3	EA	SILENCER	SR64	GRY	IVE

Self-Closing. Templating allows Spring CUSH Arm to stop the door's swing between 85 and 110 degrees with hold-open feature. Delays closing from maximum opening to approximately 70 degrees. 1 minute maximum delay time.

Heading 004

1 SGL Door 103B MEETING ROOM 101 / OFFICE AREA 103
3' 0" X 7' 0" X 1 3/4" X WD X HMF X NONRTD

Each Assembly to have:

3	EA	HINGE	55860 TA 2714 4.5 X 4 NRP	US26D	McK
1	EA	ENTRY	45H7AB 14H	626	BES
1	EA	SURFACE CLOSER	4041 DEL HEDA	689	LCN
1	EA	CUSH SHOE SUPPORT	4040-30	689	LCN

1	EA	BLADE STOP SPACER	4040-61	689	LCN
1	EA	WALL STOP	WS406/407CCV	626	IVE
1	EA	GASKETING	188S-CL	S-Cl	ZER
1	EA	DOOR BOTTOM	350A6	A	ZER
1	EA	THRESHOLD	546A MSLA-10	AL	ZER

Self-Closing. Delays closing from maximum opening to approximately 70 degrees. 1 minute maximum delay time.

Heading 005

1 SGL Door 104 OFFICE AREA 103 / OFFICE 104
3' 0" X 7' 0" X 1 3/4" X WD X HMF X NONRTD

Each Assembly to have:

3	EA	HINGE	55860 TA 2714 4.5 X 4 NRP	US26D	McK
1	EA	ENTRY	45H7AB 14H	626	BES
1	EA	WALL STOP	WS406/407CCV	626	IVE
1	EA	GASKETING	188S-CL	S-Cl	ZER
1	EA	DOOR BOTTOM	350A6	A	ZER
1	EA	THRESHOLD	546A MSLA-10	AL	ZER

Heading 006

1 SGL Door 105 OFFICE AREA 103 / STORAGE 105
1 SGL Door 112 GARAGE 117 / JANITOR 112
3' 0" X 7' 0" X 1 3/4" X WD X HMF X NONRTD

Each Assembly to have:

3	EA	HINGE	55860 TA 2714 4.5 X 4 NRP	US26D	McK
1	EA	CLASSROOM	45H7R 14H	626	BES
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

Heading 007

1 SGL Door 107 VOLUNTEER AREA 106 / STORAGE 107
3' 0" X 7' 0" X 1 3/4" X WD X HMF 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 008

1 SGL Door 106 VOLUNTEER AREA 106 / OFFICE AREA 103
3' 0" X 7' 0" X 1 3/4" X WD X HMF X NONRTD

Each Assembly to have:

3	EA	HINGE	55860 TA 2714 4.5 X 4 NRP	US26D	McK
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	GASKETING	188S-CL	S-Cl	ZER
1	EA	DOOR BOTTOM	350A6	A	ZER
1	EA	THRESHOLD	546A MSLA-10	AL	ZER

Self-Closing. Templating allows Spring CUSH Arm to stop the door's swing between 85 and 110 degrees with hold-open feature. Delays closing from maximum opening to approximately 70 degrees. 1 minute maximum delay time.

Heading 009

1 SGL Door 103A EXTERIOR / OFFICE AREA 103
3' 0" X 7' 0" X 1 3/4" X HMD X HMF X NONRTD

Each Assembly to have:

1	EA	CONT. HINGE	High Traffic	628	PEM
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	GASKETING	188S-CL	S-Cl	ZER
1	EA	DOOR BOTTOM	350A6	A	ZER
1	EA	DOOR SWEEP	8198AA	AL	ZER
1	EA	THRESHOLD	546A MSLA-10	AL	ZER

Self-Closing. Templating allows Spring CUSH Arm to stop the door's swing between 85 and 110 degrees with hold-open feature. Delays closing from maximum opening to approximately 70 degrees. 1 minute maximum delay time.

Heading 010

1 SGL Door 110 LOCKERS 109 / SHOWER 110
3' 0" X 7' 0" X 1 3/4" X WD X TMF X RATED

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-Cl	ZER

Self-Closing. Delays closing from maximum opening to approximately 70 degrees. 1 minute maximum delay time.

Heading 011

1 SGL Door 111 LOCKERS 109 / TOILET 111
3' 0" X 7' 0" X 1 3/4" X WD X TMF 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 012

1 PR Door 102A EXTERIOR / STORAGE 102
2/3' 0" X 7' 0" X 1 3/4" X HMD X HMF X NONRTD

Each Assembly to have:

2	EA	CONT. HINGE	High Traffic	628	PEM
1	SET	AUTO FLUSH BOLT	FB31P	630	TRE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	ENTRY	45H7AB 14H	626	BES
			-7/8 INCH STRAIGHT LIP STRIKE		
2	EA	SURFACE CLOSER	4041 DEL SHCUSH	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	GASKETING	188S-CL	S-Cl	ZER
1	EA	GASKETING	140A	A	ZER
2	EA	DOOR SWEEP	8198AA	AL	ZER
1	EA	THRESHOLD	546A MSLA-10	AL	ZER

Self-Closing. Templating allows Spring CUSH Arm to stop the door's swing between 85 and 110 degrees with hold-open feature. Delays closing from maximum opening to approximately 70 degrees. 1 minute maximum delay time.

Heading 013

1 PR Door 102B MEETING ROOM 101 / STORAGE 102
2/3' 0" X 7' 0" X 1 3/4" X HMD X HMF X NONRTD

Each Assembly to have:

6	EA	HINGE	55860 TA 2714 4.5 X 4 NRP	US26D	Mck
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	ENTRY	45H7AB 14H	626	BES
			-7/8 INCH STRAIGHT LIP STRIKE		
2	EA	SURFACE CLOSER	4041 DEL SHCUSH	689	LCN
2	EA	CUSH SHOE SUPPORT	4040-30	689	LCN
2	EA	BLADE STOP SPACER	4040-61	689	LCN
1	EA	GASKETING	140A	A	ZER
1	EA	MEETING STILE	44STST	STST	ZER
1	EA	THRESHOLD	546A MSLA-10	AL	ZER

Self-Closing. Templating allows Spring CUSH Arm to stop the door's swing between 85 and 110 degrees with hold-open feature. Delays closing from maximum opening to approximately 70 degrees. 1 minute maximum delay time.

Heading 014

1 SGL Door 109 GARAGE 117 / VOLUNTEER AREA 106
3' 4" X 7' 0" X 1 3/4" X WD X HMF X 90PPS

Each Assembly to have:

1	EA	CONT. HINGE	High Traffic	628	PEM
1	EA	ENTRY	45H7AB 14H	626	BES
1	EA	SURFACE CLOSER	4041 DEL SCUSH SRI	689	LCN
1	EA	CUSH SHOE SUPPORT	SRI 4040-30	689	LCN
1	EA	BLADE STOP SPACER	SRI 4040-61	689	LCN
1	EA	GASKETING	188S-CL	S-Cl	ZER
1	EA	DOOR BOTTOM	350A6	A	ZER
1	EA	THRESHOLD	546A MSLA-10	AL	ZER

Self-Closing. Templating allows Spring CUSH Arm to stop the door's swing between 85 and 110 degrees. Delays closing from maximum opening to approximately 70 degrees. 1 minute maximum delay time.
Accessories
Accessories

Heading 015

1 SGL Door 114 GARAGE 117 / IT ROOM 114
3' 0" X 7' 0" X 1 3/4" X HMD X HMF 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	546A MSLA-10	AL	ZER

Heading 016

1 SGL Door 113 GARAGE 117 / JANITOR 112
3' 0" X 7' 0" X 1 3/4" X WD X HMF X NONRTD

Each Assembly to have:

3	EA	HINGE	55860 TA 2714 4.5 X 4 NRP	US26D	McK
1	EA	CLASSROOM LOCK	9K 7R 14D	626	BES
1	EA	OH STOP	450S	630	GLY
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Heading 017

1 SGL Door 115 EXTERIOR / BATHROOM 115
1 SGL Door 116 EXTERIOR / BATHROOM 116
3' 0" X 7' 0" X 1 3/4" X HMD X HMF X NONRTD

Each Assembly to have:

1	EA	CONT. HINGE	High Traffic	628	PEM
1	EA	PRIVACY W/DB & IND	L9496L 17L L583-363 -W/ INDICATOR "OCCUPIED"	630	SCH
1	EA	MORTISE CYLINDER	1E74 C181 RP3	626	BES
1	EA	SURFACE CLOSER	4041 DEL SCUSH SRI	689	LCN
1	EA	CUSH SHOE SUPPORT	SRI 4040-30	689	LCN
1	EA	BLADE STOP SPACER	SRI 4040-61	689	LCN
1	EA	RAIN DRIP	142A	AL	ZER
1	EA	GASKETING	188S-CL	S-Cl	ZER
1	EA	DOOR SWEEP	8198AA	AL	ZER
1	EA	THRESHOLD	546A MSLA-10	AL	ZER

Knob/lever retracts latchbolt from either side. Deadbolt thrown or retracted by key outside (retraction by key required in the event of an emergency) or inside thumbturn. Throwing deadbolt locks outside knob/lever and displays “OCCUPIED” plate. Rotating inside knob/lever simultaneously retracts both deadbolt and latchbolt and unlocks outside knob/lever. Inside lever is always free for immediate egress. ADA Thumbturn.
Self-Closing. Templating allows Spring CUSH Arm to stop the door's swing between 85 and 110 degrees. Delays closing from maximum opening to approximately 70 degrees. 1 minute maximum delay time.
Accessories
Accessories

Heading 018

1 PR Door 120 EXTERIOR / STORAGE 120
2/3' 0" X 7' 0" X 1 3/4" X HMD X HMF X NONRTD

Each Assembly to have:

2	EA	CONT. HINGE	High Traffic	628	IVE
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	ENTRY	45H7AB 14H -7/8 INCH STRAIGHT LIP STRIKE	626	BES
2	EA	SURFACE CLOSER	4041 DEL SHCUSH SRI	689	LCN
2	EA	CUSH SHOE SUPPORT	SRI 4040-30	689	LCN
2	EA	BLADE STOP SPACER	SRI 4040-61	689	LCN
1	EA	RAIN DRIP	142A	AL	ZER
1	EA	MEETING STILE	44STST	STST	ZER
2	EA	DOOR SWEEP	8198AA	AL	ZER
2	EA	THRESHOLD	546A MSLA-10	AL	ZER

Self-Closing. Templating allows Spring CUSH Arm to stop the door's swing between 85 and 110 degrees with hold-open feature. Delays closing from maximum opening to approximately 70 degrees. 1 minute maximum delay time.

Heading 019

1 SGL Door 118 GARAGE 117 / OUTDOOR YARD 119
3' 4" X 7' 0" X 1 3/4" X HMD X HMF X NONRTD

Each Assembly to have:

1	EA	CONT. HINGE	High Traffic	628	PEM
1	EA	PANIC HARDWARE	CD-AX-XP-98-L-17	626	VON
1	EA	SURFACE CLOSER	4041 DEL SHCUSH SRI	689	LCN
1	EA	CUSH SHOE SUPPORT	SRI 4040-30	689	LCN
1	EA	BLADE STOP SPACER	SRI 4040-61	689	LCN
1	EA	GASKETING	188S-CL	S-Cl	ZER
1	EA	DOOR SWEEP	8198AA	AL	ZER
1	EA	THRESHOLD	546A MSLA-10	AL	ZER

Free Egress at all times. Pressing Push Bar retracts latchbolts. Latchbolt retracted by lever unless locked by key. Key locks and unlocks lever. Dogging by key cylinder locks down the pushbar or crossbar so the latchbolt remains retracted.
Self-Closing. Templating allows Spring CUSH Arm to stop the door's swing between 85 and 110 degrees with hold-open feature. Delays closing from maximum opening to approximately 70 degrees. 1 minute maximum delay time.

Heading 020

1 PR Door 121 MEETING ROOM 101 / ELECTRICAL 121
2/3' 0" X 7' 0" X 1 3/4" X HMD X HMF X NONRTD

Each Assembly to have:

6	EA	HINGE	55860 TA 2714 4.5 X 4 NRP	US26D	McK
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	DORMITORY	45H7TD 14H -7/8 INCH STRAIGHT LIP STRIKE	626	BES
2	EA	SURFACE CLOSER	4041 DEL SHCUSH	689	LCN
2	EA	CUSH SHOE SUPPORT	4040-30	689	LCN
2	EA	BLADE STOP SPACER	4040-61	689	LCN
1	EA	GASKETING	140A	A	ZER
1	EA	MEETING STILE	44STST	STST	ZER
1	EA	GASKETING	905A	A	ZER
2	EA	DOOR SWEEP	8198AA	AL	ZER
1	EA	THRESHOLD	546A MSLA-10	AL	ZER

Self-Closing. Templating allows Spring CUSH Arm to stop the door's swing between 85 and 110 degrees with hold-open feature. Delays closing from maximum opening to approximately 70 degrees. 1 minute maximum delay time.

Heading 021

1 SGL Door S1 EXTERIOR / OUTDOOR YARD 119
15' 9" X 7' 0" X 1" X MTL X MTL X NONRTD
1 SGL Door S2 EXTERIOR / OUTDOOR YARD 119

1 SGL Door S3 EXTERIOR / OUTDOOR YARD 119
4' 0" X 7' 0" X 1" X MTL X MTL X NONRTD
PATCHES FOR HARDWARE AND BALANCE OF HARDWARE BY THE GATE MANUFACTURER.

Each Assembly to have:

1	EA	CLASSROOM	45H7R 14H	630	BES

Heading 022

1	RU	Door 117A	EXTERIOR / GARAGE 117
1	RU	Door 117B	EXTERIOR / GARAGE 117
		12' 0" X 10' 0" X 1" X MTL X MTL X NONRTD	
1	RU	Door S6	EXTERIOR / OUTDOOR YARD 119
		15' 9" X 5' 0" X 1" X MTL X MTL X NONRTD	
		OVERHEAD DOOR	

Each Assembly to have:

1	BALANCE OF HARDWARE BY DOOR SUPPLIER

END OF SECTION

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows.
2. Doors.
3. Glazed entrances.
4. Storefront framing.

1.2 DEFINITIONS

A. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

B. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

C. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

D. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

a. Specified Design Wind Loads: As indicated, but not less than wind loads applicable to Project as required by ASCE 7 "Minimum Design Loads for Buildings and Other Structures": Section 6.0 "Wind Loads".
b. Specified Design Wind Loads: As indicated, but not less than wind loads applicable to Project as required by ASCE 7 "Minimum Design Loads for Buildings and Other Structures": Section 6.0 "Wind Loads."
c. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.

1) Basic Wind Speed: 110 mph.
2) Importance Factor: 1.
3) Exposure Category: C.

4) Load Duration: 60 seconds or less.

d. Probability of Breakage for Sloped Glazing: 1 lite per 1000 for lites set more than 15 degrees off vertical and under wind and snow action.

1) Load Duration: 60 days.

e. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
f. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
2. For laminated-glass lites, properties are based on products of construction indicated.

3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite 6.0 mm thick and a nominal 1/2-inch-wide interspace.
4. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:

    a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F.
    b. Solar Heat Gain Coefficient: NFRC 200.
    c. Solar Optical Properties: NFRC 300.

1.4 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Samples: 12-inch- square, for each type of glass product indicated, other than monolithic clear float glass.

C. Glazing Schedule: Use same designations indicated on Drawings.

D. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer.

1.5 QUALITY ASSURANCE

A. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing according to ASTM C 1087, samples of each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants:

B. Glazing for Fire-Rated Door and Window Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.

C. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 and, for wired glass, ANSI Z97.1.

D. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA Laminated Division's "Laminated Glass Design Guide" and GANA's "Glazing Manual."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Sloped Glazing Guidelines."
4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."

E. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the Insulating Glass Certification Council.

F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockups as shown on Drawings.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form, made out to Owner and signed by laminated-glass manufacturer agreeing to replace laminated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: Five years from date of Substantial Completion.

C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 GLASS PRODUCTS

A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.

1. Ultra-Clear (Low-Iron) Float Glass: Class I (clear); with a minimum 91 percent visible light transmission and a minimum solar heat gain coefficient of 0.87.

a. Available Products:

1) AFG Industries Inc.; Krystal Klear.
2) Pilkington Building Products North America; Optiwhite.
3) PPG Industries, Inc.; Starphire.

B. Laminated Glass: ASTM C 1172, and complying with other requirements specified and with the following:

1. Interlayer: Polyvinyl butyral or cured resin of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.

C. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.

1. Provide Kind FT (fully tempered) float glass in place of annealed glass where noted to resist thermal stresses induced by differential shading of individual glass lites, exposure to wild fire temperatures and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
2. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
3. Sealing System: Dual seal.
4. Spacer Specifications: Manufacturer's standard spacer material and construction.
5. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:

a. Spacer Material: Aluminum with powdered metal paint finish in color selected by Architect.
b. Corner Construction: Manufacturer's standard corner construction.

2.3 FIRE-RATED GLAZING PRODUCTS

A. Fire-Protection Rating**:** As indicated for the assembly in which glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.

B. Film-Faced Ceramic Glazing Material: Proprietary Category II safety glazing product in the form of a 3/16-inch- (5-mm-) thick, ceramic glazing material polished on both surfaces, faced on one surface with a clear glazing film, and as follows:

1. Product: "FireLite NT" by Nippon Electric Glass Co., Ltd., and distributed by Technical Glass Products.

C. Laminated Ceramic Glazing Material: Proprietary Category II safety glazing product in the form of 2 lites of clear ceramic glazing material laminated together to produce a laminated lite of 5/16-inch (8-mm) nominal thickness; polished on both surfaces; weighing 4 lb/sq. ft. (19.5 kg/sq. m); and as follows:

1. Product: "FireLite Plus" by Nippon Electric Glass Co., Ltd., and distributed by Technical Glass Products.

2.4 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:

1. Neoprene, ASTM C 864.
2. EPDM, ASTM C 864.
3. Silicone, ASTM C 1115.
4. Thermoplastic polyolefin rubber, ASTM C 1115.
5. Any material indicated above.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:

1. Neoprene.
2. EPDM.
3. Silicone.
4. Thermoplastic polyolefin rubber.
5. Any material indicated above.

2.5 GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:

1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Colors of Exposed Glazing Sealants:

B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

1. Single-Component Neutral- and Basic-Curing Silicone Glazing Sealants GS-<#>:

a. Available Products:
b. Type and Grade: S (single component) and NS (nonsag).
c. Class: 50.
d. Use Related to Exposure: NT (nontraffic).
e. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.

2. Neutral-Curing Silicone Glazing Sealants GS-<#>:

a. Available Products:

1) See section 079200 Joint Sealant.

b. Type and Grade: S (single component) and NS (nonsag).
c. Class: 25.
d. Use Related to Exposure: NT (nontraffic).
e. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.

C. Glazing Sealants for Fire-Resistive Glazing Producs: Identical to products used in test assemblies to obtain fire-protection rating.

2.6 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:

1. Type 1, for glazing applications in which tape acts as the primary sealant.
2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.8 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

2.9 MONOLITHIC FLOAT-GLASS UNITS

A. Uncoated Clear Float-Glass Units: Class 1 (clear) ultra-clear (low-iron) float glass.

1. Thickness: 6.0 mm.

2.10 INSULATING-GLASS UNITS

A. Insulating-Glass Units, clear or tinted as indicated:

1. Overall Unit Thickness and Thickness of Each Lite: 25 and 6.0 mm.
2. Interspace Content: Argon.
3. Outdoor Lite: Class 1 float glass.

a. Tint Color: as indicated.
b. Kind FT (fully tempered)
c. Self-Cleaning, Low-Maintenance Coating: Pyrolytic coating on first surface.

4. Indoor Lite: Laminated glass. Kind: fully tempered. (Film where indicated.)

PART 3 - EXECUTION

3.1 GLAZING

A. General: Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

1. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
2. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
3. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
4. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
5. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
6. Provide spacers for glass lites where length plus width is larger than 50 inches.
7. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

B. Tape Glazing: Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

1. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
2. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

3. Apply heel bead of elastomeric sealant.
4. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
5. Apply cap bead of elastomeric sealant over exposed edge of tape.

C. Gasket Glazing (Dry): Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

1. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
2. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
3. Install gaskets so they protrude past face of glazing stops.

D. Sealant Glazing (Wet): Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

1. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
2. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.2 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.

B. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

END OF SECTION 088000

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Interior gypsum board.
2. Tile backing panels.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch-long length for each trim accessory indicated.
2. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.

1.3 QUALITY ASSURANCE

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

PART 2 - PRODUCTS

2.1 RECYCLED CONTENT OF GYPSUM PANELS

A. Provide gypsum panel products with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 10 percent by weight.

2.2 INTERIOR GYPSUM BOARD

A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. American Gypsum Co.
    b. BPB America Inc.
    c. G-P Gypsum.
    d. Lafarge North America Inc.
    e. National Gypsum Company.
    f. PABCO Gypsum.
    g. Temple.
    h. USG Corporation.

B. Type X:

1. Thickness: 5/8 inch.
2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.

2.3 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

A. Exterior Gypsum Soffit Board: ASTM C 931/C 931M or ASTM C 1396/C 1396M, with manufacturer's standard edges.

1. 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:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. American Gypsum Co.
    b. BPB America Inc.
    c. G-P Gypsum.
    d. Lafarge North America Inc.
    e. National Gypsum Company.
    f. PABCO Gypsum.
    g. Temple.
    h. USG Corporation.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:

    a. Cornerbead.
    b. Bullnose bead.
    c. LC-Bead: J-shaped; exposed long flange receives joint compound.
    d. L-Bead: L-shaped; exposed long flange receives joint compound.
    e. U-Bead: J-shaped; exposed short flange does not receive joint compound.

f. Expansion (control) joint.
g. Curved-Edge Cornerbead: With notched or flexible flanges.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.
2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
3. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints**,** rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.

    a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use -type, all-purpose compound.

2.6 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
2. Recycled Content: Provide blankets with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 95 percent by weight.

E. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."

1. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

F. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."

G. Vapor Retarder: As specified in Division 07 Section "Thermal Insulation."

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch-wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

D. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members, or provide control joints to counteract wood shrinkage.

3.2 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
1. Type X: As indicated on Drawings.

3.3 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints at locations indicated on Drawings.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners, unless otherwise indicated.
2. LC-Bead: Use at exposed panel edges.
3. L-Bead: Use where indicated.
4. U-Bead: Use at exposed panel edges.

3.4 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below:

1. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.

    a. Primer and its application to surfaces are specified in other Division 09 Sections.

2. Level 5: Where indicated on Drawings.

    a. Primer and its application to surfaces are specified in other Division 09 Sections.

3.5 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 095123 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes acoustical tiles and concealed suspension systems for ceilings.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Coordination Drawings: Drawn to scale and coordinating acoustical tile ceiling installation with hanger attachment to building structure and ceiling mounted items. Show size and location of initial access modules.

C. Samples: For each exposed finish.

D. Research/evaluation reports.

E. Maintenance data.

1.3 QUALITY ASSURANCE

A. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory.

B. Fire-Test-Response Characteristics:

1. Fire-Resistance Characteristics: Where indicated, provide acoustical tile ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

    a. Identify materials with appropriate markings of applicable testing and inspecting agency.

2. Surface-Burning Characteristics: Acoustical tiles complying with ASTM E 1264 for Class A materials, when tested per ASTM E 84.

    a. Smoke-Developed Index: 450 or less.

C. Seismic Standard: Comply with the following:

1. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.

2. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings--Seismic Zones 0-2."
3. CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies--Seismic Zones 3 & 4."
4. UBC Standard 25-2, "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings."
5. ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

D. Preinstallation Conference: Conduct conference at Project site.

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size tiles equal to 2.0 percent of quantity installed.
2. Suspension System Components: Quantity of each concealed grid and exposed component equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL TILE CEILINGS, GENERAL

A. Acoustical Tile Standard: Comply with ASTM E 1264.

1. Recycled Content: Provide acoustical tiles with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 10 percent by weight.

B. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
1. 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 hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

C. Wire Hangers, Braces, and Ties: Zinc-coated carbon-steel wire; ASTM A 641/A 641M, Class 1 zinc coating, soft temper as indicated.

1. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch-diameter wire.

D. Seismic struts and seismic clips as indicated.

E. Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

2.2 ACOUSTICAL TILES FOR ACOUSTICAL TILE CEILING

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

B. Products: Subject to compliance with requirements, provide one of the following:

1. Armstrong World Industries, Inc.
2. BPB USA.
3. USG Interiors, Inc.

C. Color: As selected by Architect from manufacturer's full range.

D. LR: Not less than 0.85.

E. NRC: Not less than 35, Type E-400 mounting per ASTM E 795.

F. Edge/Joint Detail**:** Beveled, kerfed and rabbeted long edges and square, butt on short edges.

G. Thickness: 5/8 inch.

H. Modular Size: As indicated on Drawings.

2.3 METAL SUSPENSION SYSTEM FOR ACOUSTICAL TILE CEILING

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

B. Products: Subject to compliance with requirements, provide one of the following:

1. Armstrong World Industries, Inc.; Intermediate-duty structural classification.
2. USG Interiors, Inc.

C. Access: Upward, with each access unit identified by manufacturer's standard unobtrusive markers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with UBC Standard 25-2 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders.

C. Suspend ceiling hangers from building's structural members, plumb and free from contact with insulation or other objects within ceiling plenum. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers, use trapezes or equivalent devices. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.

1. Do not support ceilings directly from permanent metal forms or floor deck; anchor into concrete slabs.

D. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical tiles. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.

END OF SECTION 095123

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Resilient base.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.4 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive resilient products.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. Resilient Base:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Allstate Rubber Corp.; Stoler Industries.
    b. Armstrong World Industries, Inc.
    c. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
    d. Endura Rubber Flooring; Division of Burke Industries, Inc.
    e. Estrie Products International; American Biltrite (Canada) Ltd.
    f. Flexco, Inc.
    g. Johnsonite.
    h. Mondo Rubber International, Inc.
    i. Musson, R. C. Rubber Co.
    j. Nora Rubber Flooring; Freudenberg Building Systems, Inc.
    k. PRF USA, Inc.
    l. Roppe Corporation, USA.
    m. VPI, LLC; Floor Products Division.

B. Resilient Base Standard: ASTM F 1861.

1. Material Requirement: Type TS (rubber, vulcanized thermoset) or Type TP (rubber, thermoplastic).
2. Manufacturing Method: Group I (solid, homogeneous).
3. Style: Cove (base with toe).

C. Minimum Thickness: 0.125 inch.

D. Height**:** 4 inches.

E. Lengths: Cut lengths 48 inches long or coils in manufacturer's standard length.

F. Outside Corners: Preformed.

G. Inside Corners: Job formed or preformed.

H. Finish: As selected by Architect from manufacturer's full range.

I. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

    a. Cove Base Adhesives: Not more than 50 g/L.
    b. Rubber Floor Adhesives: Not more than 60 g/L.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates for Resilient Stair Treads and Accessories: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.

    a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until they are same temperature as the space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.2 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

3.3 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.

1. Apply two coat(s).

C. Cover resilient products until Substantial Completion.

END OF SECTION 096513

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Vinyl composition floor tile.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

C. Samples: Full-size units of each color and pattern of floor tile required.

D. Maintenance data.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. Warranty: 10 year, (commercial wear

1.4 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive floor tile.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 SOLID VINYL FLOOR TILE (a.k.a. Luxury Vinyl Tile – LVT)

A. Products: Basis of design product, subject to compliance with requirements, provide the following:
   1. Shaw Hard Surface; Strand 0516V.

B. Tile Standard: ASTM F 1700.

   1. Class: Class III, printed film vinyl tile.

C. Thickness: 0.100 inch (2.5 mm).

D. Size: 18 by 36 inches (457 by 914 mm).

E. Colors and Patterns: As selected by Architect from manufacturer's full range of colors and patterns.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated. Shaw 4100 or Shaw S150 spray adhesive.

   1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

      a. VCT and Asphalt Tile Adhesives: Not more than 50 g/L.
      b. Rubber Floor Adhesives: Not more than 60 g/L.

C. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
4. Moisture Testing: Perform tests recommended by floor covering manufacturer and as follows. Proceed with installation only after substrates pass testing.

    a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
    b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75% relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until they are same temperature as space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.2 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles square with East/West room axis.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain running in one direction in running bond pattern.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door in door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

G. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.3 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.

B. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.

1. Apply number of coats recommended by manufacturer.

C. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes surface preparation and the application of paint systems on the following exterior substrates:
   1. Steel.
   2. Galvanized metal.
   3. Aluminum (not anodized or otherwise coated).
   4. Wood.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each finish and for each color and texture required.

C. Product List: Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.3 QUALITY ASSURANCE

A. MPI Standards:

   1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
   2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

   1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

      a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
      b. Other Items: Architect will designate items or areas required.

   2. Final approval of color selections will be based on benchmark samples.

      a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors: As selected by Architect from manufacturer's full range.

2.2 BLOCK FILLERS

A. Interior/Exterior Latex Block Filler: MPI #4.

1. VOC Content: E Range of E3.

2.3 PRIMERS/SEALERS

A. Alkali-Resistant Primer: MPI #3.

1. VOC Content: E Range of E2.

B. Bonding Primer (Water Based): MPI #17.

1. VOC Content: E Range of E2.

C. Bonding Primer (Solvent Based): MPI #69.

1. VOC Content: E Range of E2.

D. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint system indicated.

2.4 METAL PRIMERS

A. Alkyd Anticorrosive Metal Primer: MPI #79.

1. VOC Content: E Range of E2.

B. Quick-Drying Alkyd Metal Primer: MPI #76.

1. VOC Content: E Range of E2.

C. Cementitious Galvanized-Metal Primer: MPI #26.

1. VOC Content: E Range of E1.

D. Waterborne Galvanized-Metal Primer: MPI #134.

1. VOC Content: E Range of E2.
2. Environmental Performance Rating: EPR 2.

E. Quick-Drying Primer for Aluminum: MPI #95.

1. VOC Content: E Range of E2.

2.5 WOOD PRIMERS

A. Exterior Latex Wood Primer: MPI #6.

1. VOC Content: E Range of E1.

B. Exterior Alkyd Wood Primer: MPI #5.

1. VOC Content: E Range of E2.

C. Exterior Oil Wood Primer: MPI #7.

1. VOC Content: E Range of E2.

2.6 EXTERIOR LATEX PAINTS

A. Exterior Latex (Flat): MPI #10 (Gloss Level 1).

1. VOC Content: E Range of E2.

B. Exterior Latex (Semigloss): MPI #11 (Gloss Level 5).

1. VOC Content: E Range of E2.

C. Exterior Latex (Gloss): MPI #119 (Gloss Level 6, except minimum gloss of 65 units at 60 deg).

1. VOC Content: E Range of E2.

2.7 EXTERIOR ALKYD PAINTS

A. Exterior Alkyd Enamel (Flat): MPI #8 (Gloss Level 1).

1. VOC Content: E Range of E1.

B. Exterior Alkyd Enamel (Semigloss): MPI #94 (Gloss Level 5).

1. VOC Content: E Range of E2.

C. Exterior Alkyd Enamel (Gloss): MPI #9 (Gloss Level 6).

1. VOC Content: E Range of E2.

2.8 QUICK-DRYING ENAMELS

A. Quick-Drying Enamel (Semigloss): MPI #81 (Gloss Level 5).

1. VOC Content: E Range of E2.

B. Quick-Drying Enamel (High Gloss): MPI #96 (Gloss Level 7).

1. VOC Content: E Range of E2.

2.9 TEXTURED AND HIGH-BUILD COATINGS

A. Latex Stucco and Masonry Textured Coating: MPI #42.

1. VOC Content: E Range of E3.

B. High-Build Latex (Exterior): MPI #40.

1. VOC Content: E Range of E2.

2.10 ALUMINUM PAINT

A. Aluminum Paint: MPI #1.

1. VOC Content: E Range of E2.

2.11 FLOOR COATINGS

A. Interior/Exterior Clear Concrete Floor Sealer (Water Based): MPI #99.

1. VOC Content: E Range of E2.

B. Interior/Exterior Clear Concrete Floor Sealer (Solvent Based): MPI #104.

1. VOC Content: E Range of E2.

C. Interior/Exterior Latex Floor and Porch Paint (Low Gloss): MPI #60 (maximum Gloss Level 3).

1. VOC Content: E Range of E2.
2. Environmental Performance Rating: EPR 3.

D. Exterior/Interior Alkyd Floor Enamel (Gloss): MPI #27 (Gloss Level 6).

1. VOC Content: E Range of E2.
2. Additives: Manufacturer's standard additive to increase skid resistance of painted surface.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.
4. Plaster: 12 percent.
5. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION AND APPLICATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

D. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.3 EXTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex System: MPI EXT 3.1A.

a. Prime Coat: Exterior latex matching topcoat.
b. Intermediate Coat: Exterior latex matching topcoat.
c. Topcoat: Exterior latex (flat), (semigloss) or (gloss)].

2. Latex Aggregate/Latex System: MPI EXT 3.1 B.

a. Prime Coat: Latex stucco and masonry textured coating.
b. Intermediate Coat: Exterior latex matching topcoat.
c. Topcoat: Exterior latex (flat), (semigloss) or (gloss)].

3. Latex Over Alkali-Resistant Primer System: MPI EXT 3.1K.

a. Prime Coat: Alkali-resistant primer.
b. Intermediate Coat: Exterior latex matching topcoat.
c. Topcoat: Exterior latex (flat), (semigloss) or (gloss)].

4. High-Build Latex System: MPI EXT 3.1L, applied to form dry film thickness of not less than 10 mils.

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: High-build latex (exterior).

5. Latex Aggregate System: MPI EXT 3.1N.

a. Prime Coat: As recommended in writing by topcoat manufacturer.

b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Latex stucco and masonry textured coating.

B. Concrete Substrates, Traffic Surfaces:

1. Latex Floor Paint System: MPI EXT 3.2A.

a. Prime Coat: Interior/exterior latex floor and porch paint (low gloss).
b. Intermediate Coat: Interior/exterior latex floor and porch paint (low gloss).
c. Topcoat: Interior/exterior latex floor and porch paint (low gloss).

2. Alkyd Floor Enamel System: MPI EXT 3.2D.

a. Prime Coat: Exterior/interior alkyd floor enamel (gloss).
b. Intermediate Coat: Exterior/interior alkyd floor enamel (gloss).
c. Topcoat: Exterior/interior alkyd floor enamel (gloss).

3. Clear Sealer System: MPI EXT 3.2G.

a. Prime Coat: Interior/exterior clear concrete floor sealer (solvent based).
b. Intermediate Coat: Interior/exterior clear concrete floor sealer (solvent based).
c. Topcoat: Interior/exterior clear concrete floor sealer (solvent based).

4. Water-Based Clear Sealer System: MPI EXT 3.2H.

a. Prime Coat: Interior/exterior clear concrete floor sealer (water based).
b. Intermediate Coat: Interior/exterior clear concrete floor sealer (water based).
c. Topcoat: Interior/exterior clear concrete floor sealer (water based).

C. Steel Substrates:

1. Quick-Drying Enamel System: MPI EXT 5.1A.

a. Prime Coat: Quick-drying alkyd metal primer.
b. Intermediate Coat: Quick-drying enamel matching topcoat.
c. Topcoat: Quick-drying enamel (semigloss).

2. Alkyd System: MPI EXT 5.1D.

a. Prime Coat: Alkyd anticorrosive metal primer.
b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
c. Topcoat: Exterior alkyd enamel (flat), (semigloss) or (gloss)].

3. Aluminum Paint System: MPI EXT 5.1K.

a. Prime Coat: Alkyd anticorrosive metal primer.
b. Intermediate Coat: Aluminum paint.
c. Topcoat: Aluminum paint.

D. Galvanized-Metal Substrates:

1. Latex Over Water-Based Primer System: MPI EXT 5.3H.

    a. Prime Coat: Waterborne galvanized-metal primer.
    b. Intermediate Coat: Exterior latex matching topcoat.
    c. Topcoat: Exterior latex (gloss).

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes surface preparation and the application of paint systems on the following interior substrates:

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1. Wood.
2. Gypsum board.
3. Galvanized ferrous metals.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each finish and for each color and texture required.

C. Product List: Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.3 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Resident Engineer and Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

    a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
    b. Other Items: Resident Engineer and Architect will designate items or areas required.

2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
3. Final approval of color selections will be based on benchmark samples.

a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
4. Floor Coatings: VOC not more than 100 g/L.
5. Shellacs, Clear: VOC not more than 730 g/L.
6. Shellacs, Pigmented: VOC not more than 550 g/L.
7. Flat Topcoat Paints: VOC content of not more than 50 g/L.
8. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.
9. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
10. Floor Coatings: VOC not more than 100 g/L.
11. Shellacs, Clear: VOC not more than 730 g/L.
12. Shellacs, Pigmented: VOC not more than 550 g/L.
13. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
14. Dry-Fog Coatings: VOC content of not more than 400 g/L.
15. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 340 g/L.
16. Pre-Treatment Wash Primers: VOC content of not more than 420 g/L.

C. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
2. Restricted Components: Paints and coatings shall not contain any of the following:

a. Acrolein.
b. Acrylonitrile.
c. Antimony.
d. Benzene.
e. Butyl benzyl phthalate.
f. Cadmium.
g. Di (2-ethylhexyl) phthalate.
h. Di-n-butyl phthalate.
i. Di-n-octyl phthalate.
j. 1,2-dichlorobenzene.
k. Diethyl phthalate.
l. Dimethyl phthalate.
m. Ethylbenzene.
n. Formaldehyde.
o. Hexavalent chromium.
p. Isophorone.
q. Lead.
r. Mercury.
s. Methyl ethyl ketone.
t. Methyl isobutyl ketone.
u. Methylene chloride.
v. Naphthalene.
w. Toluene (methylbenzene).
x. 1,1,1-trichloroethane.
y. Vinyl chloride.

D. Colors: As selected by Architect from manufacturer's full range.

2.2 PRIMERS/SEALERS

A. Interior Latex Primer/Sealer: MPI #50.

1. VOC Content: E Range of E1.
2. Environmental Performance Rating: EPR 1.

2.3 METAL PRIMERS

A. Alkyd Anticorrosive Metal Primer: MPI #79.

1. VOC Content: E Range of E1.

2.4 WOOD PRIMERS

A. Interior Latex-Based Wood Primer: MPI #39.

1. VOC Content: E Range of E1.
2. Environmental Performance Rating: EPR 1.

2.5 LATEX PAINTS

A. Institutional Low-Odor/VOC Latex (Low Sheen): MPI #144 (Gloss Level 2).

1. VOC Content: E Range of E3.
2. Environmental Performance Rating: EPR 4.5.

B. Institutional Low-Odor/VOC Latex (Semigloss): MPI #147 (Gloss Level 5).

1. VOC Content: E Range of E3.
2. Environmental Performance Rating: EPR 3.

2.6 FLOOR COATINGS

A. Interior/Exterior Clear Concrete Floor Sealer (Water Based): MPI #99.

1. VOC Content: E Range of E1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Wood: 15 percent.
3. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION AND APPLICATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

D. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:

1. Mechanical Work:

a. Uninsulated metal piping.
b. Uninsulated plastic piping.
c. Pipe hangers and supports.
d. Tanks that do not have factory-applied final finishes.
e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

2. Electrical Work:

a. Switchgear.
b. Panelboards.
c. Electrical equipment that is indicated to have a factory-primed finish for field painting.

E. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

F. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.3 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Traffic Surfaces:

1. Water-Based Clear Sealer System: MPI INT 3.2G.

a. First Coat: Interior/exterior clear concrete floor sealer (water based).
b. Topcoat: Interior/exterior clear concrete floor sealer (water based).

B. Steel Substrates:

1. Institutional Low-Odor/VOC Latex System: MPI INT 5.1S.

a. Prime Coat: Rust-inhibitive primer (water based).
b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
c. Topcoat: Institutional low-odor/VOC interior latex (low sheen) and (semigloss).

C. Dimension Lumber Substrates, Nontraffic Surfaces: Including exposed joists and exposed beams.

1. Institutional Low-Odor/VOC Latex System: MPI INT 6.2L.

a. Prime Coat: Interior latex-based wood primer.
b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
c. Topcoat: Institutional low-odor/VOC interior latex (flat) and (low sheen).

D. Gypsum Board Substrates:

1. Institutional Low-Odor/VOC Latex System: MPI INT 9.2M.

a. Prime Coat: Interior latex primer/sealer.
b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
c. Topcoat: Institutional low-odor/VOC interior latex (flat), (low sheen) and (semigloss).

END OF SECTION 099123

SECTION 099300 - STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes surface preparation and the application of wood finishes on the following substrates:

1. Exterior Substrates:

a. Exposed glue-laminated beams and columns.
b. Exposed dimension lumber (rough carpentry).
c. Dressed lumber (finish carpentry).
d. Exposed wood panel products.

2. Interior Substrates:

a. Exposed glue-laminated beams and columns.
b. Exposed dimension lumber (rough carpentry).
c. Dressed lumber (finish carpentry).
d. Exposed wood panel products.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each finish and for each color and texture required.

C. Product List: Printout of MPI's current "MPI Approved Products List" for each product category specified in Part 2, with the product proposed for use highlighted.

1.3 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in its "MPI Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and finish systems indicated.

B. Mockups: Apply benchmark samples of each finish system indicated and each color selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each type of finish system and substrate.

    a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
    b. Other Items: Architect will designate items or areas required.

2. Final approval of stain color selections will be based on benchmark samples.

    a. If preliminary stain color selections are not approved, apply additional benchmark samples of additional stain colors selected by Architect at no added cost to Owner.

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Material Compatibility:

1. Provide materials for use within each finish system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a finish system, provide products recommended in writing by manufacturers of topcoat for use in finish system and on substrate indicated.

B. VOC Content of Field-Applied Interior Primers, Stains, and Transparent Finishes: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to primers, stains, and transparent finishes that are applied in a fabrication or finishing shop:

1. Flat Primers: VOC content of not more than 50 g/L.
2. Nonflat Primers: VOC content of not more than 150 g/L.
3. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
4. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
5. Clear Wood Finishes, Lacquers: VOC not more than 550 g/L.
6. Floor Coatings: VOC not more than 100 g/L.
7. Shellacs, Clear: VOC not more than 730 g/L.
8. Stains: VOC not more than 250 g/L.

C. Stain Colors: As selected by Architect from manufacturer's full range.

2.2 WOOD FILLERS

A. Wood Filler Paste: MPI #91.

1. VOC Content: E Range of E2.

2.3 PRIMERS AND SEALERS

A. Exterior Alkyd Wood Primer: MPI #5.

1. VOC Content: E Range of E2.

B. Exterior Latex Wood Primer: MPI #6.

1. VOC Content: E Range of E2.

C. Exterior Oil Wood Primer: MPI #7.

1. VOC Content: E Range of E2.

D. Wood Preservative: MPI #37.

1. VOC Content: E Range of E1.

E. Alkyd Sanding Sealer: MPI #102.

1. VOC Content: E Range of E2.

F. Lacquer Sanding Sealer: MPI #84.

1. VOC Content: E Range of E2.

G. Shellac: MPI #88.

1. VOC Content: E Range of E2.

2.4 STAINS

A. Exterior Semitransparent Stain (Solvent Based): MPI #13.

1. VOC Content: E Range of E2.

B. Exterior Solid-Color Stain (Solvent Based): MPI #14.

1. VOC Content: E Range of E2.

C. Exterior, Solid-Color Latex Stain: MPI #16.

1. VOC Content: E Range of E2.

D. Stain for Wood Decks: MPI #33.

1. VOC Content: E Range of E3.

E. Interior Wood Stain (Semitransparent): MPI #90.

1. VOC Content: E Range of E2.

2.5 VARNISHES

A. Exterior Marine Spar Varnish (Gloss): MPI #28, Gloss Level 7.

1. VOC Content: E Range of E2.

B. Exterior Varnish (Gloss): MPI #29, Gloss Level 6.

1. VOC Content: E Range of E1.

C. Exterior Varnish (Semigloss): MPI #30, Gloss Level 5.

1. VOC Content: E Range of E1.

D. Interior Varnish (Flat): MPI #73, Gloss Level 1, alkyd type.

1. VOC Content: E Range of E2.

E. Interior Varnish (Semigloss): MPI #74, Gloss Level 5, alkyd type.

1. VOC Content: E Range ofE2.

F. Interior Varnish (Gloss): MPI #75, Gloss Level 6, alkyd type.

1. VOC Content: E Range of E2.

2.6 POLYURETHANE FINISHES

A. Two-Component Aliphatic Polyurethane (Clear): MPI #78.

1. VOC Content: E Range of E2.

B. Interior, Oil-Modified, Clear Urethane (Satin): MPI #57, Gloss Level 4.

1. VOC Content: E Range of E2.

C. Interior, Oil-Modified, Clear Urethane (Gloss): MPI #56, Gloss Level 6.

1. VOC Content: E Range of E2.

D. Moisture-Cured Clear Polyurethane (Flat): MPI #71, Gloss Level 1.

1. VOC Content: E Range of E2.

E. Moisture-Cured Clear Polyurethane (Gloss): MPI #31.

1. VOC Content: E Range of E2.

2.7 WATERBORNE ACRYLIC FINISHES

A. Waterborne Clear Acrylic (Satin): MPI #128, Gloss Level 4.

1. VOC Content: E Range of E2.
2. Environmental Performance Rating: EPR 2.

B. Waterborne Clear Acrylic (Semigloss): MPI #129, Gloss Level 5.

1. VOC Content: E Range of E2.
2. Environmental Performance Rating: EPR 2.

C. Waterborne Clear Acrylic (Gloss): MPI #130, Gloss Level 6.

1. VOC Content: E Range of E2.
2. Environmental Performance Rating: EPR 2.

2.8 LACQUERS

A. Lacquer (Clear Flat): MPI #87, Gloss Level 1.

1. VOC Content: E Range of E2.

B. Lacquer (Clear Satin): MPI #85, Gloss Level 4.

1. VOC Content: E Range of E2.

C. Lacquer (Clear Gloss): MPI #86, Gloss Level 6.

1. VOC Content: E Range of E2.

2.9 OIL FINISH

A. Danish Oil: MPI #92.

1. VOC Content: E Range of E3.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

1. Maximum Moisture Content of Wood Substrates: 15 percent when measured with an electronic moisture meter.
2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes.
3. Begin finish application only after unsatisfactory conditions have been corrected and surfaces are dry.
4. Beginning application of finish system constitutes Contractor's acceptance of substrate and conditions.

3.2 PREPARATION AND APPLICATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.

C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.3 INTERIOR WOOD-FINISH-SYSTEM SCHEDULE

A. Exposed Glue-Laminated Beam and Column Substrates:

1. Polyurethane Varnish Over Stain System: MPI INT 6.1J.

    a. Stain Coat: Interior wood stain (semitransparent).
    b. Two Finish Coats: Interior, oil-modified, clear urethane (gloss).

2. Polyurethane Varnish System: MPI INT 6.1D.

    a. One Factory-Applied Finish Coat: Matching field-applied finish coats.
    b. Two Field-Applied Finish Coats: Interior, oil-modified, clear urethane (gloss).

3. Moisture-Cured Clear Polyurethane Over Stain System: MPI INT 6.1S.

    a. Stain Coat: Interior wood stain (semitransparent).

b. Two Finish Coats: Moisture-cured clear polyurethane (gloss).

B. Exposed Rough Carpentry Substrates:

1. Polyurethane Varnish Over Stain System: MPI INT 6.2J.

a. Stain Coat: Interior wood stain (semitransparent).
b. **Two** Finish Coats: Interior, oil-modified, clear urethane **(satin)**.

2. Polyurethane Varnish System: MPI INT 6.2H.

a. **Three** Finish Coats: Interior, oil-modified, clear urethane **(gloss)**.

C. Finish Carpentry Substrates:

1. Polyurethane Varnish Over Stain System: MPI INT 6.3E.

a. Stain Coat: Interior wood stain (semitransparent).
b. Two Finish Coats: Interior, oil-modified, clear urethane (gloss).

2. Polyurethane Varnish System: MPI INT 6.3K.

a. One Factory-Applied Finish Coat: Matching field-applied finish coats.
b. Two Field-Applied Finish Coats: Interior, oil-modified, clear urethane (gloss).

END OF SECTION 099300

SECTION 101100 - VISUAL DISPLAY SURFACES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Tackboards.
   2. Sliding visual display units.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

   1. Include rated capacities, operating characteristics, electrical characteristics and individual panel weights for sliding visual display units.

B. LEED Submittal:

   1. Product Data for Credit EQ 4.4: For composite wood products, documentation indicating that the product contains no urea formaldehyde.

C. Shop Drawings: For visual display surfaces. Include plans, elevations, sections, details, and attachments to other work.

   1. Show locations of panel joints.
   2. Include sections of typical trim members.
   3. Wiring Diagrams: For power, signal, and control wiring.

D. Samples: For each exposed product and for each color and texture specified.

E. Qualification Data: For qualified Installer.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for surface-burning characteristics of fabrics.

G. Operation and Maintenance Data: For visual display surfaces and power-operated units to include in maintenance manuals.

H. Warranties: Sample of special warranties.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of motor-operated, sliding visual display units required for this Project.

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 50 or less.

C. 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.

D. Preinstallation Conference: Conduct conference at Project site.

1.4 WARRANTY

A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer's standard form in which manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Surfaces lose original writing and erasing qualities.
b. Surfaces exhibit crazing, cracking, or flaking.

2. Warranty Period: Life of the building.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Vinyl Fabric: Mildew resistant, washable, complying with FS CCC-W-408D, Type II, indicated; weighing not less than 13 oz./sq. yd. (440 g/sq. m); with surface-burning characteristics indicated.

B. Polyester Fabric: Nondirectional weave, 100 percent polyester; weighing not less than 15 oz./sq. yd. (508 g/sq. m); with surface-burning characteristics indicated.

C. Hardboard: ANSI A135.4, tempered.

D. Particleboard: ANSI A208.1, Grade M-1, made with binder containing no urea formaldehyde.

E. Fiberboard: ASTM C 208.

F. Extruded Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6063.

2.2 TACKBOARD ASSEMBLIES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. A-1 Visual Systems.
2. AARCO Products, Inc.
3. ADP Lemco, Inc.
4. Aywon.
5. Bangor Cork Company, Inc.
6. Best-Rite Manufacturing.
7. Claridge Products and Equipment, Inc.
8. Egan Visual Inc.
9. Ghent Manufacturing, Inc.
10. Marsh Industries, Inc.; Visual Products Group.
11. Platinum Visual Systems; a division of ABC School Equipment, Inc.
12. PolyVision Corporation; a Steelcase company.
13. Tri-Best Visual Display Products.

B. Polyester-Fabric-Faced Tackboard: Polyester fabric factory laminated to 1/2-inch- (13-mm-) thick fiberboard backing.

2.3 TACKBOARD ACCESSORIES

A. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch- (1.57-mm-) thick, extruded aluminum; slim size and standard shape.
   1. Factory-Applied Trim: Manufacturer's standard.

2.4 FABRICATION

2.5 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

B. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.

C. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display surfaces and wall surfaces.

B. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

C. Clean visual display surfaces according to manufacturer's written instructions. Attach one cleaning label to visual display surface in each room. Cover and protect visual display surfaces.

END OF SECTION 101100

SECTION 102239 - FOLDING PANEL PARTITIONS

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. Manually operated, acoustical panel partitions.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for supports that attach supporting tracks to overhead structural system.

1.3 DEFINITIONS

A. NIC: Noise Isolation Class.

B. NRC: Noise Reduction Coefficient.

C. STC: Sound Transmission Class.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For operable panel partitions.

1. Include plans, elevations, sections, attachment details, and numbered panel installation sequence.
2. Indicate stacking and operating clearances. Indicate location and installation requirements for hardware and track, blocking, and direction of travel.
3. Include diagrams for power, signal, and control wiring.

C. Samples for Initial Selection: For each type of exposed material, finish, covering, or facing.

1. Include Samples of accessories involving color selection.

D. Samples for Verification: For each type of exposed material, finish, covering, or facing, prepared on Samples of size indicated below:

1. Textile Facing Material: Full width by not less than 36-inch- (914-mm-) long section of fabric from dye lot to be used for the Work, with specified treatments applied. Show complete pattern repeat.
2. Panel Facing Material: Manufacturer's standard-size unit, not less than 3 inches (75 mm) square.
3. Panel Edge Material: Not less than 3 inches (75 mm) long.
4. Chair Rail: Manufacturer's standard-size unit, 6 inches (150 mm) long.
5. Hardware: One of each exposed door-operating device.

E. Delegated-Design Submittal: For operable panel partitions.

1. Include design calculations for seismic restraints that brace tracks to structure above.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling 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. Partition track, track supports and bracing, switches, turning space, and storage layout.
2. Suspended ceiling components.
3. Structural members to which suspension systems will be attached.
4. Size and location of initial access modules for acoustical tile.
5. Items penetrating finished ceiling including the following:

a. Lighting fixtures.
b. HVAC ductwork, outlets, and inlets.
c. Speakers.
d. Sprinklers.
e. Smoke detectors.

B. Setting Drawings: For embedded items and cutouts required in other work, including support-beam, mounting-hole template.

C. Qualification Data: For Installer and testing agency.

D. Seismic Qualification Certificates: For operable panel partitions, tracks, accessories, and components, from manufacturer. Include seismic capacity of partition assemblies to remain in vertical position during a seismic event and the following:

1. Basis for Certification: Indicate whether certification is based on analysis, testing, or experience data, according to ASCE/SEI 7.
2. Detailed description of partition anchorage devices on which the certification is based and their installation requirements.

E. Product Certificates: For each type of operable panel partition.

1. Include approval letter signed by manufacturer acknowledging Owner-furnished panel facing material complies with requirements.

F. Product Test Reports: For each operable panel partition, for tests performed by a qualified testing agency.

G. Field quality-control reports.

H. Sample Warranty: For manufacturer's special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For operable panel partitions to include in maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Panel finish facings and finishes for exposed trim and accessories. Include precautions for cleaning materials and methods that could be detrimental to finishes and performance.
b. Seals, hardware, track, track switches, carriers, and other operating components.
c. Electric operator and controls.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same production run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Panel Finish-Facing Material: Furnish full width in quantity to cover both sides of two panels when installed.

1.9 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Protectively package and sequence panels in order for installation. Clearly mark packages and panels with numbering system used on Shop Drawings. Do not use permanent markings on panels.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of operable panel partitions that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Faulty operation of operable panel partitions.
    b. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Period: **10** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design seismic bracing of tracks to structure above.

B. Seismic Performance: Operable panel partitions shall withstand the effects of earthquake motions determined according to ASCE/SEI 7**.**

1. The term "withstand" means "the partition panels will remain in place without separation of any parts when subjected to the seismic forces specified."

C. Acoustical Performance: Provide operable panel partitions tested by a qualified testing agency for the following acoustical properties according to test methods indicated:

1. Sound-Transmission Requirements: Operable panel partition assembly tested for laboratory sound-transmission loss performance according to ASTM E 90, determined by ASTM E 413, and rated for not less than the STC indicated.
2. Noise-Reduction Requirements: Operable panel partition assembly, identical to partition tested for STC, tested for sound-absorption performance according to ASTM C 423, and rated for not less than the NRC indicated.

D. Fire-Test-Response Characteristics: Provide panels with finishes complying with one of the following as determined by testing identical products by a testing and inspecting agency acceptable to authorities having jurisdiction:

1. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

    a. Flame-Spread Index: 25 or less.
    b. Smoke-Developed Index: 450 or less.

2. Fire Growth Contribution: Complying with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.

E. Fire Resistance: Provide fire-rated operable panel partition assemblies complying with NFPA 80, based on testing according to UL 10B for fire-rated door assemblies.

1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard

construction requirements for tested and labeled fire-rated door assemblies except for size.

2. Pass doors in fire-rated operable panel partition assemblies shall meet positive-pressure requirements.

2.2 SEALS

A. Description: Seals that produce operable panel partitions complying with performance requirements and the following:

1. Manufacturer's standard seals unless otherwise indicated.
2. Seals made from materials and in profiles that minimize sound leakage.
3. Seals fitting tight at contact surfaces and sealing continuously between adjacent panels and between operable panel partition perimeter and adjacent surfaces, when operable panel partition is extended and closed.

B. Vertical Seals: Deep-nesting, interlocking steel astragals mounted on each edge of panel, with continuous, resilient acoustical seal.

C. Horizontal Top Seals: resilient, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on track when extended.

D. Horizontal Bottom Seals: Manufacturer's standard continuous-contact seal exerting uniform constant pressure on floor.

E. Horizontal Bottom Seals: Resilient, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on floor when extended, ensuring horizontal and vertical sealing and resisting panel movement.

1. Mechanically Operated for Acoustical Panels: Extension and retraction of bottom seal by operating handle or built-in operating mechanism, with operating range not less than 1-1/2 inches (38 mm) between retracted seal and floor finish.

2.3 PANEL FINISH FACINGS

A. Description: Finish facings for panels that comply with indicated fire-test-response characteristics and that are factory applied to operable panel partitions with appropriate backing, using mildew-resistant nonstaining adhesive as recommended by facing manufacturer's written instructions.

1. Apply one-piece, seamless facings free of air bubbles, wrinkles, blisters, and other defects, with no gaps or overlaps. Horizontal butted edges are not permitted. Tightly secure and conceal raw and selvage edges of facing for finished appearance.
2. Where facings with directional or repeating patterns or directional weave are indicated, mark facing top and attach facing in same direction.
3. Match facing pattern 72 inches (1830 mm) above finished floor.

B. Paint: Manufacturer's standard factory-painted finish.

1. Color: As selected by Architect from manufacturer's full range.

C. Cap-Trimmed Edges: Protective perimeter-edge trim with tight hairline joints concealing edges of panel and finish facing, finished as follows:

1. Steel, Painted: Finished with manufacturer's color as selected by Architect from manufacturer's full range.

D. Trimless Edges: Fabricate exposed panel edges so finish facing wraps uninterrupted around panel, covering edge and resulting in an installed partition with facing visible on vertical panel edges, without trim, for minimal sightlines at panel-to-panel joints.

2.4 SUSPENSION SYSTEMS

A. Tracks: Steel or aluminum mounted directly to overhead structural support, with adjustable steel hanger rods for overhead support, designed for operation, size, and weight of operable panel partition indicated. Size track to support partition operation and storage without damage to suspension system, operable panel partitions, or adjacent construction. Limit track deflection to no more than 0.10 inch (2.54 mm) between bracket supports. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.

1. Panel Guide: Aluminum guide on both sides of the track to facilitate straightening of the panels; finished with factory-applied, decorative, protective finish.
2. Head Closure Trim: As required for acoustical performance; with factory-applied, decorative, protective finish.

B. Carriers: Trolley system as required for configuration type, size, and weight of partition and for easy operation; with ball-bearing wheels.

C. Steel Finish: Manufacturer's standard, factory-applied, corrosion-resistant, protective coating unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine flooring, floor levelness, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable panel partitions.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install operable panel partitions and accessories after other finishing operations, including painting, have been completed in area of partition installation.

B. Install panels in numbered sequence indicated on Shop Drawings.

C. Broken, cracked, chipped, deformed, or unmatched panels are not acceptable.

D. Broken, cracked, deformed, or unmatched gasketing or gasketing with gaps at butted ends is not acceptable.

E. Light-Leakage Test: Illuminate one side of partition installation and observe vertical joints and top and bottom seals for voids. Adjust partitions for alignment and full closure of vertical joints and full closure along top and bottom seals.

3.3 FIELD QUALITY CONTROL

A. An operable panel partition installation will be considered defective if it does not pass tests and inspections.

B. Prepare test and inspection reports.

3.4 ADJUSTING

A. Adjust operable panel partitions, hardware, and other moving parts to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust pass doors to operate smoothly and easily, without binding or warping.

C. Verify that safety devices are properly functioning.

3.5 MAINTENANCE SERVICE

A. Maintenance Service: Beginning at Substantial Completion, maintenance service shall include **12** months' full maintenance by manufacturer's authorized service representative. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operable-partition operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain operable panel partitions.

END OF SECTION 102239

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Public-use washroom accessories.
2. Public-use shower room accessories.
3. Custodial accessories.

B. Owner-Furnished Material:

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule:

1. Identify locations using room designations indicated on Drawings.
2. Identify products using designations indicated on Drawings.

PART 2 - PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

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:

C. Basis-of-Design Product: The design for accessories is based on products indicated. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation.
5. General Accessory Manufacturing Co. (GAMCO).

D. Toilet Tissue (Roll) Dispenser:

1. Description: Vertical roll-in-reserve dispenser with hinged front secured with tumbler lockset.
2. Mounting: Surface mounted.
3. Operation: Noncontrol delivery with theft-resistant spindle.
4. Capacity: Designed for 5-inch-diameter tissue rolls.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

E. Paper Towel (Folded) Dispenser:
1. Mounting: Surface mounted.
2. Minimum Capacity: 400 C-fold or 525 multifold towels.
3. Material and Finish: Stainless steel, No. 4 finish (satin).
4. Lockset: Tumbler type.
5. Refill Indicators: Pierced slots at sides or front.

F. Waste Receptacle:
1. Mounting: Surface mounted.
2. Minimum Capacity: 12.75 gal.
3. Material and Finish: Stainless steel, No. 4 finish (satin).
4. Liner: Reusable vinyl liner.
5. Lockset: Tumbler type for waste-receptacle.

G. Liquid-Soap Dispenser:
1. Description: Designed for dispensing soap in liquid or lotion form.
2. Mounting: Vertically oriented, surface mounted.
3. Capacity: 40-fl oz.
4. Materials: Stainless steel, No. 4 finish (satin).
5. Lockset: Tumbler type.
6. Refill Indicator: Window type.

H. Grab:

1. Basis-of-Design Product:
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.

a. Finish: Smooth, No. 4, satin finish on ends and slip-resistant texture in grip area.

4. Outside Diameter**:** 1-1/2 inches.
5. Configuration and Length: As indicated on Drawings.

I. Vendor:
1. Type: Sanitary napkin and tampon.
2. Mounting: Surface mounted.
3. Capacity:
4. Operation: Single coin (25 cents).
5. Exposed Material and Finish: Stainless steel, No. 4 finish (satin) Lockset: Tumbler type with separate lock and key for coin box.

J. Seat-Cover Dispenser:
1. Mounting: Surface mounted.

2. Minimum Capacity: 500 seat covers.
3. Exposed Material and Finish: Stainless steel, No. 4 finish (satin).

K. Mirror Unit:
1. Frame: Stainless-steel angle, 0.05 inch thick.

a. Corners: Mitered and mechanically interlocked.

2. Integral Shelf: 5 inches deep.
3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.

a. One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

4. Size: As indicated on Drawings.

2.2 SHOWER ROOM ACCESSORIES

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:

C. Basis-of-Design Product: The design for accessories is based on products indicated. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation.
5. General Accessory Manufacturing Co. (GAMCO).

D. Shower Curtain Rod:
1. Description: 1-inch OD; fabricated from nominal 0.0375-inch-thick stainless steel. Mounting Flanges: Stainless-steel flanges designed for exposed fastener.
2. Finish: No. 4 (satin).

E. Shower Curtain:
1. Size: Minimum 6 inches wider than opening by 72 inches high.
2. Material: Nylon-reinforced vinyl, minimum 10-oz. or 0.008-inch- thick vinyl, with integral antibacterial agent.
3. Color: As selected from manufacturer's full range of color.
4. Grommets: Corrosion resistant at minimum 6 inches o.c. through top hem.

5. Shower Curtain Hooks: Chrome-plated or stainless-steel, spring wire curtain hooks with snap fasteners, sized to accommodate specified curtain rod. Provide one hook per curtain grommet.

F. Folding Shower Seat
   1. Configuration: L-shaped seat, designed for wheelchair access.
   2. Seat: Phenolic or polymeric composite of slat-type or one-piece construction in color as selected by Architect.
   3. Mounting Mechanism: Stainless steel, No. 4 finish (satin).
   4. Dimensions: As indicated on drawings.

G. Soap Dish:
   1. Description: Without washcloth bar.
   2. Mounting: Surface mounted.
   3. Material and Finish: Stainless steel, No. 4 finish (satin).

2.3 CUSTODIAL ACCESSORIES

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:

C. Basis-of-Design Product: The design for accessories is based on products indicated. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

   1. A & J Washroom Accessories, Inc.
   2. American Specialties, Inc.
   3. Bobrick Washroom Equipment, Inc.
   4. Bradley Corporation.
   5. General Accessory Manufacturing Co. (GAMCO).

D. Utility Shelf:

   1. Basis-of-Design Product:
   2. Description: With exposed edges turned down not less than 1/2 inch and supported by two triangular brackets welded to shelf underside.
   3. Size: 16 inches long by 6 inches deep.
   4. Material and Finish: Not less than nominal 0.05-inch- thick stainless steel, No. 4 finish (satin).

E. Mop and Broom Holder:
   1. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
   2. Length: 36 inches.
   3. Hooks: Three.
   4. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.
   5. Material and Finish: Stainless steel, No. 4 finish (satin).

a. Shelf: Not less than nominal 0.05-inch- thick stainless steel.
b. Rod: Approximately 1/4-inch- diameter stainless steel.

2.4 FABRICATION

A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

END OF SECTION 102800

SECTION 104413 - FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fire protection cabinets for fire extinguishers.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each exposed product and for each color and texture specified.

D. Maintenance data.

1.3 QUALITY ASSURANCE

A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

B. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

C. Coordinate sizes and locations of fire protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:

1. Sheet: ASTM B 209
2. Extruded Shapes: ASTM B 221.

C. Clear Float Glass: ASTM C 1036, Type I, Class 1, Quality q3 6 mm thick.

2.2 FIRE PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher. Fire extinguisher cabinet must comply with CBC Sections 1117B.6 and 1118B.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Fire End & Croker Corporation.
b. J. L. Industries, Inc., a division of Activar Construction Products Group.
c. Kidde Residential and Commercial Division, Subsidiary of Kidde plc.
d. Larsen's Manufacturing Company.
e. Modern Metal Products, Division of Technico Inc.
f. Moon-American; Potter Roemer LLC.
g. Watrous Division, American Specialties, Inc.; Second and third options in first paragraph below are available only for recessed and semirecessed cabinets.

B. Cabinet Construction: Nonrated.

C. Cabinet Material: Steel sheet.

D. Semirecessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semirecessed cabinet installation. Red, baked enamel.

1. Rolled-Edge Trim: 2-1/2-inch backbend depth.

E. Cabinet Trim Material**:** Same material and finish as door.

F. Door Material: Stainless-steel sheet.

G. Door Style: Fully glazed panel with frame.

H. Door Glazing: Clear float glass.

1. Acrylic Sheet Color: Clear transparent acrylic sheet.
2. Acrylic Sheet Color: Clear transparent acrylic sheet painted red on unexposed side.

I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

J. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet.

3. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
4. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.

    a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."

        1) Location: Applied to location indicated on Drawings.
        2) Application Process: Silk-screened.
        3) Lettering Color: Red.
        4) Orientation: Vertical.

K. Finishes:

1. Manufacturer's standard baked-enamel paint for the following:

    a. Exterior of cabinet, door, and trim, except for those surfaces indicated to receive another finish.
    b. Interior of cabinet and door.

    c. Color and Gloss: As selected by Architect from manufacturer's full range.

2. Stainless Steel: No. 2B.

    a. Color: Match Architect's sample.

2.3 FABRICATION

A. Fire Protection Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Miter and weld joints and grind smooth.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets will be installed and prepare recesses as required by type and size of cabinet and trim style.

B. Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights indicated below Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.

C. Identification: Apply decal at locations indicated.

D. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Operation and maintenance data.

C. Warranty: Sample of special warranty.

1.3 QUALITY ASSURANCE

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

C. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Failure of hydrostatic test according to NFPA 10.
    b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet and mounting bracket indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide Insert manufacturer's name; product name or designation or comparable product by one of the following:

    a. Amerex Corporation.
    b. Ansul Incorporated; Tyco International Ltd.
    c. Badger Fire Protection; a Kidde company.
    d. Buckeye Fire Equipment Company.
    e. Fire End & Croker Corporation.
    f. J. L. Industries, Inc.; a division of Activar Construction Products Group.
    g. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
    h. Larsen's Manufacturing Company.
    i. Moon-American.
    j. Pem All Fire Extinguisher Corp.; a division of PEM Systems, Inc.
    k. Potter Roemer LLC.
    l. Pyro-Chem; Tyco Safety Products.

3. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.

B. Multipurpose Dry-Chemical Type: UL-rated nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

C. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

    a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.

END OF SECTION 104416

SECTION 105113 - METAL LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Standard metal lockers with hinged doors.
2. Metal tops and filler panels.
3. Locker benches.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For metal lockers. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For units with factory-applied color finishes.

D. Maintenance data.

E. Warranty: Sample of special warranty.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Where metal lockers and benches are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1.

B. Preinstallation Conference: Conduct conference at Project site.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver master and control keys to Owner by registered mail or overnight package service.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.

1. Warranty Period for Knocked-Down Metal Lockers: Two years from date of Substantial Completion.
2. Warranty Period for All-Welded Metal Lockers: Lifetime from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.

B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with A60 zinc-iron, alloy (galvannealed) coating designation.

C. Extruded Aluminum: ASTM B 221, alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated.

D. Steel Tube: ASTM A 500, cold rolled.

E. Particleboard: ANSI A208.1, Grade M-2.

F. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.

G. Anchors: Material, type, and size required for secure anchorage to each substrate.

1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls, and elsewhere as indicated, for corrosion resistance.
2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.2 STANDARD METAL LOCKERS

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1. Art Metal Products; Standard Quiet Lockers.
2. ASI Storage Solutions Inc.; Traditional Collection.
3. DeBourgh Mfg. Co.; Worley Lockers.
4. Hadrian Manufacturing Inc.; Emperor Lockers.
5. List Industries Inc.; Classic Line of Superior KD Lockers.
6. Lyon Workspace Products, LLC; Standard Lockers.
7. Penco Products, Inc.; Vanguard Lockers.
8. Republic Storage Systems Company; Standard Lockers.
9. Shanahan's Manufacturing Limited; Deluxe Series Lockers.
10. Tennsco Corp.; Tennsco Lockers.

B. Locker Arrangement: As indicated on Drawings.

C. Material: Cold-rolled steel sheet.

D. Body and Shelves: Assembled by riveting or bolting body components together. Fabricate from unperforated 0.024-inch nominal-thickness steel sheet.

E. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral door strike full height on vertical main frames.

F. Doors: One piece; fabricated from 0.060-inch nominal-thickness steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.

1. Doors less than 12 inches wide may be fabricated from 0.048-inch nominal-thickness steel sheet.
2. Doors for box lockers less than 15 inches wide may be fabricated from 0.048-inch nominal-thickness steel sheet.
3. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.
4. Stiffeners: Manufacturer's standard full-height stiffener fabricated from 0.048-inch nominal-thickness steel sheet; welded to inner face of doors.
5. Door Style: Louvered vents at top and bottom.

G. 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. Knuckle Hinges: Steel, full loop, five or seven knuckles, tight pin; minimum 2 inches high. Provide no fewer than three hinges for each door more than 42 inches high.
2. Continuous Hinges: Manufacturer's standard, steel, full height.

H. Projecting Door Handle and Latch: Finger-lift latch control designed for use with either built-in combination locks or padlocks; positive automatic latching, chromium plated; pry and vandal resistant.

1. Latch Hooks: Equip doors 48 inches and higher with three latch hooks; fabricated from 0.105-inch nominal-thickness steel sheet; welded or riveted to full-height door strikes; with resilient silencer on each latch hook.
2. 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.

I. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond face of door; pry and vandal resistant.

1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks, built-in key locks, or padlocks; positive automatic latching and prelocking.

a. Latch Hooks: Equip doors 48 inches (1219 mm) and higher with three latch hooks and doors less than 48 inches (1219 mm) high with two latch hooks; fabricated

from 0.105-inch (2.66-mm) nominal-thickness steel sheet; welded or riveted to full-height door strikes; with resilient silencer on each latch hook.

b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated with vinyl or nylon 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.

2. Single-Point Latching: Nonmoving latch hook designed to engage bolt of built-in combination or cylinder lock.

a. Latch Hook: Equip each door with one latch hook, fabricated from 0.105-inch nominal-thickness steel sheet; welded midway up full-height door strike; with resilient silencer.

J. Door Handle and Latch for 16-Person Lockers: Stainless-steel strike plate with integral pull; with steel padlock loop that projects through metal locker door.

K. Combination Padlocks: Key-controlled, three-number dialing combination locks; capable of five combination changes.

L. Built-in Combination Locks: Key-controlled, three-number dialing combination locks; capable of at least five combination changes made automatically with a control key.

1. Bolt Operation: Manually locking deadbolt or automatically locking spring bolt.

M. Cylinder Locks: Built-in, flush, cam locks with five-pin tumbler keyway, keyed separately and master keyed. Furnish two change keys for each lock and two master keys.

1. Key Type: Grooved, with minimum 2- by 2.68-inch (51- by 68.3-mm) key head for accessible lockers.
2. Bolt Operation: Automatically locking spring bolt.

N. Equipment: Equip each metal locker with identification plate and the following unless otherwise indicated:

1. Single-Tier Units: Shelf, one double-prong ceiling hook, and two single-prong wall hooks.
2. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
3. Triple-Tie Units: One double-prong ceiling hook.
4. Coat Rods: For each compartment of double-tier metal lockers.

O. Accessories:

1. Legs: 6 inches high; formed by extending vertical frame members, or fabricated from 0.075-inch nominal-thickness steel sheet; welded to bottom of locker.

a. Closed Front and End Bases: Fabricated from 0.036-inch (0.91-mm) nominal-thickness steel sheet.

2. Continuous Zee Base: Fabricated from manufacturer's standard thickness, but not less than 0.060-inch nominal-thickness steel sheet.

   a. Height: 6 inches.

3. Continuous Sloping Tops: Fabricated from manufacturer's standard thickness, but not less than 0.036-inch nominal-thickness steel sheet.

   a. Closures: Hipped-end type.

4. Individual Sloping Tops: Fabricated from 0.024-inch nominal-thickness steel sheet.
5. Recess Trim: Fabricated from 0.048-inch nominal-thickness steel sheet.
6. Filler Panels: Fabricated from manufacturer's standard thickness, but not less than 0.036-inch nominal-thickness steel sheet.
7. Boxed End Panels: Fabricated from 0.060-inch nominal-thickness steel sheet.
8. Finished End Panels: Fabricated from 0.024-inch nominal-thickness steel sheet.

P. Finish: Powder coat.

1. Color: As selected by Architect from manufacturer's full range.

2.3 HEAVY-DUTY METAL LOCKERS

A. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:

1. Art Metal Products; Champ Corridor Lockers.
2. DeBourgh Mfg. Co.; Sentry Corridor/Personnel Lockers.
3. List Industries Inc.; Marquis Protector.
4. Lyon Workspace Products, LLC; All-Welded Lockers.
5. Penco Products, Inc.; All-Welded Lockers.

B. Locker Arrangement: Double tier.

C. Material: Cold-rolled steel sheet.

D. Body: Assembled by welding body components together. Fabricate from unperforated steel sheet with 0.048-inch nominal-thickness backs and 0.060-inch nominal-thickness tops, bottoms, sides, and shelves.

E. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral door strike full height on vertical main frames.

F. Doors: One piece; fabricated from 0.075-inch nominal-thickness steel sheet; 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.

2. Door Style: Perforated vents.

G. 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. Knuckle Hinges: Steel, full loop, five or seven knuckles, tight pin; minimum 2 inches high. Provide no fewer than three hinges for each door more than 42 inches high.
2. Continuous Hinges: Manufacturer's standard, steel, full height.

H. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond face of door; pry and vandal resistant.

1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks or padlocks; positive automatic latching and prelocking.

a. Latch Hooks: Equip doors less than 48 inches (1219 mm) high with two latch hooks; fabricated from 0.120-inch (3.04-mm) nominal-thickness steel sheet; welded to full-height door strikes; with resilient silencer on each latch hook.
b. 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.

I. Combination Padlocks: Key-controlled, three-number dialing combination locks; capable of five combination changes.

J. Built-in Combination Locks: Key-controlled, three-number dialing combination locks; capable of at least five combination changes made automatically with a control key.

1. Bolt Operation: Automatically locking spring bolt.

K. Equipment: Equip each metal locker with identification plate and the following unless otherwise indicated:

1. Single-Tier Units: Shelf, one double-prong ceiling hook, and two single-prong wall hooks.
2. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
3. Triple-Tier Units: One double-prong ceiling hook.
4. Coat Rods: For each compartment of double-tier metal lockers.

L. Accessories:

1. Legs: 6 inches high; formed by extending vertical frame members, or fabricated from 0.075-inch nominal-thickness steel sheet; welded to bottom of locker.

a. Closed Front and End Bases: Fabricated from 0.036-inch nominal-thickness steel sheet.

2. Continuous Zee Base: Fabricated from, manufacturer's standard thickness, but not less than 0.060-inch nominal-thickness steel sheet.

a. Height: 6 inches.

3. Continuous Sloping Tops: Fabricated from 0.048-inch nominal-thickness steel sheet, with a pitch of approximately 20 degrees.

a. Closures: Hipped-end type.

4. Recess Trim: Fabricated from 0.048-inch nominal-thickness steel sheet.
5. Filler Panels: Fabricated from 0.048-inch nominal-thickness steel sheet.
6. Boxed End Panels: Fabricated from 0.048-inch nominal-thickness steel sheet.

M. Finish: powder coat.

1. Color(s): Two colors, with door one color and frame and body another color; as selected by Architect from manufacturer's full range.

2.4 KEYLESS LOCKS

A. Built-in, Card-Operated Locks: Self-contained units mounted on interior of door with replaceable lock cylinders keyed separately and master keyed. Mount instruction decals on both faces of door. Furnish one change card key for each lock and one master card key.

1. Bolt Operation: Manually locking deadbolt o [automatically locking spring bolt.

2.5 LOCKER BENCHES

A. Provide bench units with overall assembly height of 17-1/2 inches.

B. Bench Tops: Manufacturer's standard one-piece units, with rounded corners and edges.

1. Size: Minimum 9-1/2 inches wide by 1-1/4 inches thick except provide minimum 20-inch- (508-mm-) wide tops where accessible benches are indicated.
2. Laminated clear hardwood with one coat of clear sealer on all surfaces and one coat of clear lacquer on top and sides.

C. Fixed Pedestals: Manufacturer's standard supports, with predrilled fastener holes for attaching bench top and anchoring to floor, complete with fasteners and anchors, and as follows:

1. Tubular Steel: 1-1/2-inch- diameter steel tubing threaded on both ends, with standard pipe flange at top and bell-shaped cast-iron base; with baked-enamel or powder-coat finish; anchored with exposed fasteners.

a. Color: As selected by Architect from manufacturer's full range.

2.6 FABRICATION

A. Fabricate metal lockers square, rigid, and without warp and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.

1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.

B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments. Factory weld frame members of each metal locker together to form a rigid, one-piece assembly.

C. Knocked-Down Construction: Fabricate metal lockers using nuts, bolts, screws, or rivets for preassembly at plant prior to shipping.

D. All-Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections; with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds flush.

E. Accessible Lockers: Fabricate as follows:

1. Locate bottom shelf no lower than 15 inches above the floor.
2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above the floor.

F. Hooks: Manufacturer's standard ball-pointed type, aluminum or steel; zinc plated.

G. Coat Rods: Fabricated from 1-inch- diameter steel; chrome finished.

H. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch high.

I. Continuous Base: Formed into channel or zee profile for stiffness, and fabricated in lengths as long as practical to enclose base and base ends of metal lockers; finished to match lockers.

J. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.

1. Sloping-top corner fillers, mitered.

K. Individual Sloping Tops: Fabricated in width to fit one locker frame in lieu of flat locker tops; with integral back; finished to match lockers. Provide wedge-shaped divider panels between lockers.

L. Recess Trim: Fabricated with minimum 2-1/2-inch face width and in lengths as long as practical; finished to match lockers.

M. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.

N. Boxed End Panels: Fabricated with 1-inch- wide edge dimension, and designed for concealing fasteners and holes at exposed ends of nonrecessed metal lockers; finished to match lockers.

1. Provide one-piece panels for double-row (back-to-back) locker ends.

O. Finished End Panels: Designed for concealing unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.

1. Provide one-piece panels for double-row (back-to-back) locker ends.

P. Center Dividers: Full-depth, vertical partitions between bottom and shelf; finished to match lockers.

2.7 STEEL SHEET FINISHES

A. Powder-Coat Finish: Immediately after cleaning and pretreating, electrostatically apply manufacturer's standard, baked-polymer, thermosetting powder finish. Comply with resin manufacturer's written instructions for application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install 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 and bottom of lockers.

B. All-Welded Metal Lockers: Connect groups together with standard fasteners, with no exposed fasteners on face frames.

C. Equipment and Accessories: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.

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.

4. Attach recess trim to recessed metal lockers with concealed clips.
5. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings.
6. Attach sloping-top units to metal lockers, with closures at exposed ends.
7. Attach boxed end panels with concealed fasteners to conceal exposed ends of nonrecessed metal lockers.
8. Attach finished end panels with fasteners only at perimeter to conceal exposed ends of nonrecessed metal lockers.

D. Fixed Locker Benches: Provide no fewer than two pedestals for each bench, uniformly spaced not more than 72 inches apart. Securely fasten tops of pedestals to undersides of bench tops, and anchor bases to floor.

E. Freestanding Locker Benches: Place benches in locations indicated on Drawings.

END OF SECTION

SECTION 113100 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Cooking equipment including ranges and microwave ovens.
2. Ventilation range hoods.
3. Refrigerator/freezers.
4. Icemakers.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated including ENERGY STAR documentation.

B. Samples: For each exposed finish.

C. Appliance Schedule: Use same designations indicated.

D. Maintenance data.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Residential Appliances: Comply with NAECA standards.

D. Energy Ratings: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer of each appliance specified agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.

1. Electric Range: Five-year limited warranty for surface-burner elements.
2. Microwave Oven: Five-year limited warranty for defects in the magnetron tube.
3. Refrigerator/Freezer: Five-year limited warranty on the sealed refrigeration system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Basis-of-Design Product: The design for each residential appliance is based on the product named. Subject to compliance with requirements, provide either the product indicated or a comparable product by one of the other manufacturers specified.

2.2 COOKING APPLIANCES

A. Range freestanding, electric.

   1. Basis-of-Design Product: Product indicated or a comparable product approved by the City.
   2. Type: Standard with electric oven.
   3. Cooktop: Four electric burner elements.
   4. Oven(s): One, electric.
   5. Finish: As Indicated

B. Microwave Oven:

   1. Basis-of-Design Product: Product indicated or a comparable product approved by the City.
   2. Oven Capacity: 1.5 cu. ft. (0.04 cu m).

C. Exhaust Hood:

   1. Basis-of-Design Product: as indicated or approved equal.

2.3 REFRIGERATION APPLIANCES

A. Refrigerator/Freezer:

   1. Basis-of-Design Product: as indicated or a comparable product approved by the City.

   2. Type: Freestanding, frost-free, two-door, with freezer on bottom.

B. Icemaker:

   1. Basis-of-Design Product: as indicated or a comparable product approved by the City.

   2. Type: Under the counter.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.

B. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

C. Utilities: Refer to Divisions 15 and 16 and drawings for plumbing and electrical requirements.

END OF SECTION 113100

SECTION 115213 - PROJECTION SCREENS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Electrically operated projection screens and controls.

B. Related Sections:
   1. Division 26 Sections for electrical service and connections including device boxes for switches and conduit, where required, for low-voltage control wiring.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For projection screens. Show layouts and types of projection screens. Include the following:

   1. For electrically operated projection screens and controls:

      a. Location of screen centerline relative to ends of screen case.
      b. Location of wiring connections.
      c. Location of seams in viewing surfaces.
      d. Anchorage details.
      e. Wiring diagrams.

PART 2 - PRODUCTS

2.1 ELECTRICALLY OPERATED PROJECTION SCREENS

A. General: Manufacturer's standard units consisting of case, screen, motor, controls, mounting accessories, and other components necessary for a complete installation.

   1. Controls: Remote, key-operated, three-position control switch.

      a. Provide locking cover plates for switches.
      b. Provide key-operated, power-supply switch.
      c. Provide infrared remote control.

   2. Motor in Roller: Instant-reversing motor with permanently lubricated ball bearings, automatic thermal-overload protection, preset limit switches, and positive-stop action to prevent coasting.

3. End-Mounted Motor: Instant-reversing, gear-drive motor with permanently lubricated ball bearings, automatic thermal-overload protection, preset limit switches, and positive-stop action to prevent coasting.
4. Tab Tensioning: Provide units that have a durable low-stretch cord, such as braided polyester, on each side of screen connected to edge of screen by tabs to pull screen flat horizontally. In lieu of tab tensioning, screens may be constructed from vinyl-coated screen cloth that contains horizontal stiffening monofilaments to resist edge curling.

B. Surface-Mounted, Metal-Encased, Electrically Operated Screens: Motor-in-roller or end-mounted motor units designed and fabricated for surface mounting on wall or ceiling, fabricated from formed-steel sheet or from aluminum extrusions; with flat back design and vinyl covering or baked-enamel finish.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Motor in Roller:

1) BEI Audio-Visual Products; Laminar XL.
2) Da-Lite Screen Company; Cosmopolitan Electrol.
3) Draper Inc.
4) Stewart Filmscreen Corporation; Model A ElectriScreen.

b. End-Mounted Motor.

1) Bretford, Inc.; Series 700.

2.2 FRONT-PROJECTION SCREEN MATERIAL

A. Matte-White Viewing Surface: Peak gain not less than 0.9, and gain not less than 0.8 at an angle of 50 degrees from the axis of the screen surface.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BEI Audio-Visual Products; Matte White.
b. Bretford, Inc.; Matte White.
c. Da-Lite Screen Company; Matte White.
d. Draper Inc.; Fiberglass Matte White.

B. Matte-Gray Viewing Surface: Peak gain not less than 0.8, and half-gain angle of not less than 50 degrees from the axis of the screen surface.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Da-Lite Screen Company; High Contrast Da-Mat.
b. Draper Inc.; HiDefGrey.
c. Stewart Filmscreen Corporation; GrayHawk.

C. Matte Reflective Viewing Surface: Peak gain not less than 1.3, and half-gain angle of at least 40 degrees from the axis of the screen surface.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BEI Audio-Visual Products; Matte White.
b. Bretford, Inc.; Matte White.
c. Draper Inc.; Fiberglass Matte White.
d. Da-Lite Screen Company; Matte White

D. Seamless Construction: Provide screens, in sizes indicated, without seams.

E. Edge Treatment: Without black masking borders.

F. Size of Viewing Surface: 72 by 72 inches.

PART 3 - EXECUTION

3.1 FRONT-PROJECTION SCREEN INSTALLATION

A. Install front-projection screens at locations indicated to comply with screen manufacturer's written instructions.

B. Install front-projection screens with screen cases in position and in relation to adjoining construction indicated. Securely anchor to supporting substrate in a manner that produces a smoothly operating screen with vertical edges plumb and viewing surface flat when screen is lowered.

1. Install low-voltage controls according to NFPA 70 and complying with manufacturer's written instructions.

a. Wiring Method: Install wiring in raceway except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use UL-listed plenum cable in environmental air spaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.

2. Test electrically operated units to verify that screen controls, limit switches, closures, and other operating components are in optimum functioning condition.

END OF SECTION 115213

SECTION 12 93 00

SITE FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Picnic tables
2. Bicycle racks
3. Bike Work Station
4. Barbeque Grill

B. Related Sections include the following:

1. Division 32 Section "Landscape Architectural Concrete" for installation of anchor bolts cast and formed voids in concrete footings.
2. Division 31 Section "Earth Moving" for excavation for installation of concrete footings.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For units with factory-applied color finishes.

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Size: Not less than 6-inch- (152-mm-) long linear components and 4-inch- (102-mm-) square sheet components.

D. Product Schedule: For site furnishings. Use same designations indicated on Drawings.

E. Maintenance Data: For site furnishings to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of site furnishing(s) through one source from a single manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel and Iron: Free of surface blemishes and complying with the following:

1. Plates, Shapes, and Bars: ASTM A 36/A 36M.
2. Steel Pipe: Standard-weight steel pipe complying with ASTM A 53, or electric-resistance-welded pipe complying with ASTM A 135.
3. Tubing: Cold-formed steel tubing complying with ASTM A 500.
4. Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A 513, or steel tubing fabricated from steel complying with ASTM A 1011/A 1011M and complying with dimensional tolerances in ASTM A 500; zinc coated internally and externally.
5. Sheet: Commercial steel sheet complying with ASTM A 1011/A 1011M.
6. Expanded Metal: Carbon-steel sheets, deburred after expansion, and complying with ASTM F 1267.
7. Malleable-Iron Castings: ASTM A 47/A 47M, grade as recommended by fabricator for type of use intended.
8. Gray-Iron Castings: ASTM A 48/A 48M, Class 200.

B. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107; recommended in writing by manufacturer, for exterior applications.

C. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound; resistant to erosion from water exposure without needing protection by a sealer or waterproof coating; recommended in writing by manufacturer, for exterior applications.

D. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:

1. Zinc-Coated Tubing: External, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. (0.27 kg/sq. m) of zinc after welding, a chromate conversion coating, and a clear, polymer film. Internal, same as external or consisting of 81 percent zinc pigmented coating, not less than 0.3 mil (0.0076 mm) thick.
2. Hot-Dip Galvanizing: According to ASTM A 123/A 123M, ASTM A 153/A 153M, or ASTM A 924/A 924M.

2.2 PICNIC TABLES

A. See plans for model number, finish and quantity.

B. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings by the following manufacturer:

1. As indicated on Drawings.

2.3 BICYCLE RACKS

A. See plans for model number, finish, lid options, coatings and quantity.

B. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings by the following manufacturer:

1. As indicated on Drawings.

2.4 BIKE WORK STATION

A. See plans for model number, finish, lid options, coatings and quantity.

B. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings by the following manufacturer:

1. As indicated on Drawings.

2.5 BARBEQUE GRILL

A. See plans for model number, finish, lid options, coatings and quantity.

B. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings by the following manufacturer:

1. As indicated on Drawings.

2.6 FABRICATION

A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.

B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.

C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.

D. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.

E. Factory Assembly: Assemble components in the factory to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.7 ANTI GRAFFITI COATING

A. Unless otherwise specified in the drawings or indicated by the landscape architect, all site furnishings shall receive Anti-Graffiti Coating, either manufacturer applied or contractor applied per the manufacturer's instructions and requirements.

B. Basis-of-Design Product: Subject to compliance with requirements, provide the product by the following manufacturer:

1. Graffiti Solutions System by GSS Coatings, LLC , GSSCC-100 Clear Flat, or GSSCC-200 Pigmented Flat installed by a certified applicator, or approved equal. Refer to manufacturer's recommendations for undercoat requirements based on material being coated. GSS Base coatings GSS-500 Aqualock Water Repellent and GSS-307 Base Coat as determined by Architect and GSS Coatings recommendations.

    a. GSS Coatings LLC, 801-255-9505, contact Gordon Daw gordon@gsscoatings.com
    b. If proposed equal is not pre-approved thirty (30) days prior to bid, then it will not be considered or accepted under any circumstances.

C. System Performance: Provide anti-graffiti coating system complying with the following:

1. Permanent coating system. Coatings shall not require re application regardless of number of graffiti taggings during the life of the 10 year performance warranty period.
2. Show no signs of deterioration or change of appearance after graffiti removal during the warranty period. No ghosting staining or shadowing.
3. Capability of removing 100% of all types of paint and graffiti materials from treated surfaces without damaging the coating or the substrate.
4. Upon graffiti removal, no evidence of graffiti shall remain.
5. Capable of withstanding a minimum of 120 cleaning cycles over the same area without measurable coating deterioration.
6. Shall not increase dirt pick-up of substrate.

7. Meet the following test results for the following chemicals:

   a. MEK No effect after 5 days
   b. Carboxylic Acid No effect after 5 days
   c. 75% Phosphoric Acid No effect after 5 days
   d. 37% HCL 3 hours blister
   e. 50% Sulfuric Acid No effect after 5 days
   f. 20% NIT 68 hours blister g.
   g. Finish Sheen <5° on Gardner Gloss Meter
   h. ASTM B 117 and ASTM D 714 (salt spray minimum acceptable of 8000 hours.
   i. ASTM D 530 (hardness)
   j. ASTM D 412 (tensile strength and elongation)
   k. ASTM D 522 (pass 3/8 inch mandral)
   l. ASTM 968 (abrasion test)
   m. ASTM E 96 (vapor transmission)
   n. Water clear, non-yellowing, free of waxes and urethanes.
   o. Shall allow moisture vapor transmission

D. Application: Per manufacture recommendations.

E. Mock-up area to be completed and approved prior to application to remaining substrate.

F. VOC Classification: Provide materials that comply with the South Coast Air Quality Management District's VOC classification.

G. Graffiti Remover: GSS-400 Erasol®; Non-flammable, biodegradable, with a pH 7 - 8.5 and recyclable, allowing graffiti removal without the use of blasting equipment, hot water, or high pressure wash equipment. Furnish GSS-400 Erasol® graffiti removal materials in quantities described below.

   1. Quantity: One full case (12, 16 ounce bottles).

H. Warranty: 10 Year System Performance Warranty: Provide written warranty signed by manufacturer that exhibits defects in materials or workmanship. Defects are defined to include failure to withstand complete graffiti removal, ghosting, shadowing, chemical staining, yellowing, and normal environmental effects. Refer to GSS Coatings, LLC 10 Year Warranty. To obtain warranty service the purchaser must contact GSS Coatings, LLC in writing.

   1. Warranty process to per GSS Coatings Warranty Procedures to include testing of treated substrates via Skype or FACETIME with GSS Coatings, LLC
   2. Warranty period: 10 years from date of completion.

2.8 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Landscape Architectural and Metal Products" for recommendations for applying and designating finishes.

B. 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.

2.9 STEEL AND GALVANIZED STEEL FINISHES

A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

B. PVC Finish: Manufacturer's standard, UV-light stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC-plastisol finish, with flame retardant added; complying with coating manufacturer's written instructions for pretreatment, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and [securely anchored] [positioned] at locations indicated on Drawings.

D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and 3/4 inch (19 mm) larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

3.3 ANTI GRAFFITI COATING

A. Apply the water repellant and anti-graffiti undercoating(s) and finish coating(s) per the manufacturer’s written instructions. An airless sprayer shall be used for all surfaces and applications, unless otherwise recommended by the manufacturer. Test a small area before applying to the entire surface.

3.4 CLEANING

A. After completing site furnishing installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

END OF SECTION 129300

SECTION 220523.12 - 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. One-Piece, Brass Ball Valves:

1. Nibco Corporation or approved equal.
2. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 400 psig.
c. Body Design: One piece.
d. Body Material: Forged brass or bronze.
e. Ends: Threaded and soldered.
f. Seats: PTFE.
g. Stem: Brass or stainless steel.
h. Ball: Chrome-plated brass or stainless steel.
i. Port: Reduced.

B. Two-Piece, Brass Ball Valves with Full Port and Brass Trim:

1. Nibco Corporation or approved equal.
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. Two-Piece, Brass Ball Valves with Regular Port and Brass Trim:

1. Nibco Corporation or approved equal.
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. One-Piece, Bronze Ball Valves:

1. Nibco Corporation or approved equal.
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. Two-Piece, Bronze Ball Valves with Full Port, and Bronze or Brass Trim:

1. Nibco Corporation or approved equal.
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. Two-Piece, Bronze Ball Valves with Regular Port and Bronze or Brass Trim:

1. Nibco Corporation or approved equal.
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 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. One piece, brass ball valve.
3. One piece, bronze ball valve with bronze trim.
4. Two-piece, brass ball valves with full port and brass trim.
5. Two-piece, bronze ball valves with full port and bronze or brass trim.

END OF SECTION 220523.12

SECTION 220548.13 - VIBRATION 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.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Delegated-Design Submittal: For each vibration isolation device.

1. Include design calculations for selecting vibration isolators.

PART 2 - PRODUCTS

2.1 ELASTOMERIC ISOLATION PADS

A. Elastomeric Isolation Pads:

1. Mason Industries, Inc. or approved equal.
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. Mason Industries, Inc. or approved equal.
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. Mason Industries, Inc. or approved equal.
2. Description: All-directional isolator with 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. Mason Industries, Inc. or approved equal.
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. Mason Industries, Inc. or approved equal.

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 threaded mounting holes and internal leveling device.

2.6 RESTRAINED-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators with Vertical-Limit Stop Restraint:

1. Mason Industries, Inc. or approved equal.
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.

2.7 HOUSED-RESTRAINED-SPRING ISOLATORS

A. Freestanding, Steel, Open-Spring Isolators with Vertical-Limit Stop Restraint in Two-Part Telescoping Housing: .

1. Mason Industries, Inc. or approved equal.
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 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.

2.9 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.

2.10 ELASTOMERIC HANGERS

A. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods:

1. Mason Industries, Inc. or approved equal.
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.

2.11 SPRING HANGERS

A. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression:

1. Mason Industries, Inc. or approved equal.
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.

PART 3 - EXECUTION

3.1 VIBRATION CONTROL 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 specified in Section 033000 "Cast-in-Place Concrete."

B. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.

END OF SECTION 220548.13

SECTION 220553 - 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. Brady Corporation or approved equal.

2. Material and Thickness: Brass, 0.032-inch aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
3. Letter Color: White.
4. Background Color: Red.
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. Brady Corporation or approved equal.
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.
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. Brady Corporation or approved equal.

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: Red.

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. Brady Corporation or approved equal.

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: Size letters according to ASME A13.1 for piping.

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. Piping Color Coding: Painting of piping is specified in Section 099123 "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:

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.

C. 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 220553

SECTION 220719 - 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 220716 "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. Pittsburgh Corning Corporation or approved equal.
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. Armacell LLC., or approved equal.

H. Mineral-Fiber, Preformed Pipe Insulation:

1. Pittsburgh Corning Corporation or approved equal.
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. Armacell LLC., or approved equal

2.2 INSULATING CEMENTS

A. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

1. 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. 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. Armacell LLC.
2. Adhesive: As recommended by flexible elastomeric and polyolefin manufacturer and with a VOC content of 80 g/L or less.

D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Eagle Bridges - Marathon Industries.
2. Adhesive: As recommended by mineral fiber manufacturer and with a VOC content of 80 g/L or less.

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. Eagle Bridges - Marathon Industries.
2. Adhesives shall have a VOC content of 80 g/L or less.

F. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Johns Manville; a Berkshire Hathaway company.
2. Adhesive: As recommended by Adhesive - PVC Jacket manufacturer and with a VOC content of 50 g/L or less.

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. Mastics: As recommended by insulation manufacturer and with a VOC content of 50 g/L or less.

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Knauf Insulation or approved equal.
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. Knauf Insulation or approved equal.
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. Foster Brand; H. B. Fuller Construction Products or approved equal.
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.
6. Sealant shall have a VOC content of 420 g/L or less.

B. FSK and Metal Jacket Flashing Sealants:

1. Foster Brand; H. B. Fuller Construction Products or approved equal.
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.
6. Sealant shall have a VOC content of 420 g/L or less.

C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. H. B. Fuller Construction Products or approved equal.
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.
6. Sealant shall have a VOC content of 420 g/L or less.

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. H. B. Fuller Construction Products or approved equal.

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. Johns Manville; a Berkshire Hathaway company or approved equal.
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. H. B. Fuller Construction Products or approved equal.
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: 3-mil-thick, heat-bonded polyethylene and kraft paper.
5. Moisture Barrier for Outdoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper.
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. 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. Knauf Insulation or approved equal.
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. Knauf Insulation or approved equal.
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. Ideal Tape Co., Inc., an American Biltrite Company or approved equal.
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. Ideal Tape Co., Inc., an American Biltrite Company or approved equal.
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, 1/2 inch wide with wing seal or closed seal.

1. ITW Insulation Systems; Illinois Tool Works, Inc. or approved equal.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.

C. Wire: 0.080-inch nickel-copper alloy.

1. C & F Wire or approved equal.

2.11 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers,:

1. Zurn Industries, LLC. Or approved equal.
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. Zurn Industries, LLC. Or approved equal.
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 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.4 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 specifiedin Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.11 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: 1/2 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: 1/2 inch thick.
2. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick.
3. Polyolefin: 1/2 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.

B. Domestic Hot and Recirculated Hot Water: 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.

C. Sanitary Waste Piping Where Heat Tracing Is Installed: Insulation shall be one of the following:

1. Cellular Glass: 2 inches thick.
2. Mineral-Fiber, Preformed Pipe Insulation, Type I: 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: 20 mils thick.
3. Aluminum, Smooth: 0.016 inch thick.

D. Piping, Exposed:

1. None.
2. PVC: 20 mils thick.
3. Aluminum, Smooth: 0.016 inch thick.

3.17 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.
2. PVC: 20 mils thick.
3. Aluminum, Smooth: 0.016 inch thick.

D. Piping, Exposed:

1. PVC: 20 mils thick.
2. Painted Aluminum, Smooth: 0.016 inch thick.

3.18 UNDERGROUND, FIELD-INSTALLED INSULATION JACKET

A. For underground direct-buried piping applications, install underground direct-buried jacket over insulation material.

END OF SECTION 220719

SECTION 221113 - FACILITY WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes water-distribution piping and related components outside the building for water service and fire-service conduits.

B. Utility-furnished products include water meters that will be furnished to the site, ready for installation.

1.2 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.

C. Field quality-control test reports.

D. Operation and maintenance data.

1.3 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. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.

D. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

E. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.

F. NSF Compliance:

1. Comply with NSF 14 for plastic potable-water-service piping.

2. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.4 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 written permission.

1.5 COORDINATION

A. Coordinate connection to water main with utility company.

PART 2 - PRODUCTS

A. PVC, AWWA Pipe: AWWA C900, SCHEDULE 40 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, Class 150 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 Division 22 Section "Common Work Results for Plumbing" 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. Tubular-Sleeve Pipe Couplings:

1. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners and with ends of same sizes as piping to be joined.

a. Standard: AWWA C219.

2.3 GATE VALVES

A. AWWA, Cast-Iron Gate Valves:

1. 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:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

a. American AVK Co.; Valves & Fittings Div.
b. American Cast Iron Pipe Co.; American Flow Control Div.
c. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
d. Crane Co.; Crane Valve Group; Stockham Div.
e. East Jordan Iron Works, Inc.
f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
g. McWane, Inc.; Kennedy Valve Div.
h. McWane, Inc.; M & H Valve Company Div.
i. McWane, Inc.; Tyler Pipe Div.; Utilities Div.
j. Mueller Co.; Water Products Div.
k. NIBCO INC.
l. U.S. Pipe and Foundry Company.

B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches (125 mm) in diameter.

1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

C. Indicator Posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

2.4 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers:

1. 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:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide Watts, Lead Free, Series LF919, RPZA or a comparable product by one of the following:

    a. Ames Fire & Waterworks; a division of Watts Regulator Co.
    b. Conbraco Industries, Inc.
    c. FEBCO; SPX Valves & Controls.
    d. Flomatic Corporation.
    e. Watts Water Technologies, Inc.
    f. Zurn Plumbing Products Group; Wilkins Water Control Products Div.

    g. 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.
    h. Air-Gap Fitting: ASME A112.1.2, matching backflow preventer connection.

2.5 FIRE DEPARTMENT CONNECTIONS

A. Fire Department Connections:

1. 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:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

    a. Elkhart Brass Mfg. Co., Inc.
    b. Fire End & Croker Corporation.
    c. Guardian Fire Equipment, Inc.
    d. Kidde Fire Fighting.
    e. Potter Roemer.
    f. Reliable Automatic Sprinkler Co., Inc.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Refer to Division 31 Section "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, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.

E. Underground water-service piping [NPS 3/4 to NPS 3 (DN 20 to DN 80)] shall be soft copper tube, [ASTM B 88, Type K (ASTM B 88M, Type A)] [ASTM B 88, Type L (ASTM B 88M, Type B)]; wrought-copper, solder-joint fittings; and brazed joints.

F. Water Meter Box Water-Service Piping [NPS 3/4 to NPS 2 (DN 20 to DN 50)] shall be same as underground water-service piping.

G. 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.

3.3 PIPING SYSTEMS - COMMON REQUIREMENTS

A. See Division 22 Section "Common Work Results for Plumbing" for piping-system common requirements.

3.4 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 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.

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. Bury piping with depth of cover over top at least 30 inches (750 mm), with top at least 12 inches (300 mm) below level of maximum frost penetration.

J. 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.

K. Sleeves are specified in Division 22 Section "Common Work Results for Plumbing."

L. Mechanical sleeve seals are specified in Division 22 Section "Common Work Results for Plumbing."

M. 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.

3.5 JOINT CONSTRUCTION

A. See Division 22 Section "Common Work Results for Plumbing" for basic piping joint construction.

B. Make pipe joints according to the following:

1. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
2. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.

3. 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.
4. PE Piping Insert-Fitting Joints: Use plastic insert fittings and fasteners according to fitting manufacturer's written instructions.
5. 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.
6. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure. Refer to Division 22 Section "Common Work Results for Plumbing" for joining piping of dissimilar metals.

3.6 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.

3.7 FIRE DEPARTMENT CONNECTION INSTALLATION

A. Install protective pipe bollards on two sides of on three sides of each fire department connection. Pipe bollards are specified in Division 05 Section "Metal Fabrications."

3.8 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. See Division 22 Section "Common Work Results for Plumbing" for piping connections to valves and equipment.

C. Connect water-distribution piping to existing water main, Use tapping sleeve and tapping valve.

D. Connect water-distribution piping to interior domestic water and fire-suppression piping.

3.9 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.

3.10 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 Division 31 Section "Earth Moving."

B. Permanently attach equipment nameplate or marker indicating plastic water-service piping, on main electrical meter panel. See Division 22 Section "Common Work Results for Plumbing" for identifying devices.

3.11 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 221113

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes under-building-slab and aboveground domestic water pipes, tubes, and fittings inside buildings.

B. Related Requirements:

1. Section 221113 "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."

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, Grade B, 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 PVC PIPE AND FITTINGS

A. PVC Pipe: ASTM D 1785, Schedule 40.

B. PVC Socket Fittings: ASTM D 2466 for Schedule 40.

C. PVC Schedule 80 Threaded Fittings: ASTM D 2464.

2.6 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 A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

F. Solvent Cements for Joining CPVC Piping and Tubing: ASTM F 493.

1. Adhesive primer shall have a VOC content of 550 g/L or less.

2. Solvent cement shall have a VOC content of 490 g/L or less.

G. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

1. Adhesive primer shall have a VOC content of 550 g/L or less.
2. Solvent cement shall have a VOC content of 510 g/L or less.
3. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

H. Plastic, Pipe-Flange Gaskets, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.7 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. Charlotte Pipe and Foundry Company or approved equal.
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. NIBCO INC. or approved equal.
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.

2.8 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. Zurn Industries, LLC or approved equal.
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. Zurn Industries, LLC or approved equal.
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. Pipeline Seal and Insulator, Inc or appoved equal.
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. Grinnell Mechanical Products.
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 312000 "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 220519 "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Section 221119 "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 221119 "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 220548 "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 piping 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 220519 "Meters and Gages for Plumbing Piping."

T. Install thermostats in hot-water circulation piping. Comply with requirements for thermostats in Section 221123 "Domestic Water Pumps."

U. Install thermometers on inlet and outlet piping from each water heater. Comply with requirements for thermometers in Section 220519 "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 220517 "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 220517 "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 220518 "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," "Brazed 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 Piping: Join according to ASTM F 1807.

J. 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 unions.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flange kits.

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 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "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 piping 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 piping 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-69 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 220553 "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 40; 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 40; socket fittings; and solvent-cemented joints.

F. Under-building-slab, combined domestic water, building-service, and fire-service-main piping, NPS 6 to NPS 12, shall be one of the following:

1. Plain-end, ductile-iron pipe; grooved-joint, ductile-iron-pipe appurtenances; and grooved joints.

G. 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.

H. Aboveground domestic water piping, NPS 2 and smaller, shall be one of 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; cast- or wrought-copper, solder-joint fittings; and brazed joints.
3. Hard copper tube, ASTM B 88, Type L; copper pressure-seal-joint fittings; and pressure-sealed joints.
4. Hard copper tube, ASTM B 88, Type L; copper push-on-joint fittings; and push-on joints.
5. CPVC, Schedule 40; socket fittings; and solvent-cemented joints.

6. CPVC, Schedule 80 pipe; CPVC, Schedule 80 threaded fittings; and threaded joints.
7. CPVC Tubing System: CPVC tube; CPVC socket fittings; and solvent-cemented joints. NPS 1-1/2 and NPS 2 CPVC pipe with CPVC socket fittings may be used instead of tubing.
8. PEX tube, NPS 1 and smaller; fittings for PEX tube; and crimped joints.
9. PVC, Schedule 40; socket fittings; and solvent-cemented joints.

I. Aboveground domestic water piping, NPS 2-1/2 to NPS 4, shall be one of the following:

1. Hard copper tube, ASTM B 88, Type L; cast- or wrought-copper, solder-joint fittings; and brazed joints.
2. Hard copper tube, ASTM B 88, Type L; copper pressure-seal-joint fittings; and pressure-sealed joints.
3. Hard copper tube, ASTM B 88, Type L; grooved-joint, copper-tube appurtenances; and grooved joints.
4. Galvanized-steel pipe and nipples; galvanized, gray-iron threaded fittings; and threaded joints.
5. CPVC, Schedule 40; socket fittings; and solvent-cemented joints.
6. CPVC, Schedule 80 pipe; CPVC, Schedule 80 threaded fittings; and threaded joints.
7. PVC, Schedule 40; socket fittings; and solvent-cemented joints.

J. Aboveground domestic water piping, NPS 5 to NPS 8, shall be one of the following:

1. Hard copper tube, ASTM B 88, Type L; cast- or wrought-copper, solder-joint fittings; and soldered joints.
2. Hard copper tube, ASTM B 88, Type L; grooved-joint, copper-tube appurtenances; and grooved joints.
3. Galvanized-steel pipe and nipples; galvanized, gray-iron threaded fittings; and threaded joints.
4. PVC, Schedule 40; socket fittings; and solvent-cemented joints.

K. Aboveground, combined domestic water-service and fire-service-main piping, NPS 6 to NPS 12, shall be one of the following:

1. Plain-end, ductile-iron pipe; grooved-joint, ductile-iron-pipe appurtenances; and grooved joints.
2. Galvanized-steel pipe and nipples; galvanized, gray-iron threaded fittings; and threaded joints.

END OF SECTION 221116

SECTION 221313 - FACILITY SANITARY SEWERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes gravity-flow, nonpressure sanitary sewerage outside the building, with the following components:

1. Cleanouts.
2. Precast concrete manholes.

1.2 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: 10-foot head of water (30 kPa)

1.3 SUBMITTALS

A. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.

B. Coordination Drawings: Show pipe sizes, locations, and elevations.

C. Field quality-control test reports.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, fitting, and joining materials.

2.3 PVC PIPE AND FITTINGS

A. PVC Sewer Pipe and Fittings, NPS 15 (DN 375) and Smaller: ASTM D 3034, SDR 35 with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.

2.4 NONPRESSURE-TYPE PIPE 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 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 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.

C. Unshielded, Flexible Couplings: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

1. Available Manufacturers:

a. Dallas Specialty & Mfg. Co.
b. Fernco Inc.
c. Logan Clay Products Company (The).
d. Mission Rubber Company; a division of MCP Industries, Inc.
e. NDS Inc.
f. Plastic Oddities, Inc.

D. Shielded, Flexible Couplings: 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.

1. Available Manufacturers:

a. Cascade Waterworks Mfg.
b. Dallas Specialty & Mfg. Co.
c. Mission Rubber Company; a division of MCP Industries, Inc.

E. Ring-Type, Flexible Couplings: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

1. Available Manufacturers:

a. Fernco Inc.
b. Logan Clay Products Company (The).
c. Mission Rubber Company; a division of MCP Industries, Inc.

2.5 CLEANOUTS

A. Gray-Iron Cleanouts: 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.

1. Available Manufacturers:

   a. Josam Company.
   b. MIFAB Manufacturing Inc.
   c. Smith, Jay R. Mfg. Co.
   d. Wade Div.; Tyler Pipe.
   e. Watts Industries, Inc.
   f. Watts Industries, Inc.; Enpoco, Inc. Div.
   g. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.

2. Top-Loading Classification: Heavy duty.
3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. 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. Install gravity-flow, nonpressure, drainage piping according to the following:

1. Install piping pitched down in direction of flow, at minimum slope of 1.0 percent, unless otherwise indicated.
2. Install piping NPS 6 (DN 150) 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 piping below frost line.

5. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
6. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.

F. 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.

3.2 PIPE JOINT CONSTRUCTION

A. Basic piping joint construction is specified in Division 22 Section "Common Work Results for Plumbing." Where specific joint construction is not indicated, follow piping manufacturer's written instructions.

B. 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 ductile-iron, gravity sewer piping according to AWWA C600 for push-on joints.
4. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-gasket joints.
5. Join dissimilar pipe materials with nonpressure-type, flexible couplings.

3.3 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 cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

1. Use light-duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
2. Use medium-duty, top-loading classification cleanouts in paved foot-traffic areas.
3. 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 deep. Set with tops 1 inch (25 mm) above surrounding grade.

C. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

3.4 CONNECTIONS

A. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains specified in Division 22 Section "Sanitary Waste and Vent Piping."

B. 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).

3.5 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. 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. Allowable leakage is maximum of 50 gal./inch of nominal pipe size per mile (4.6 L/millimeter of nominal pipe size per kilometer) of pipe, during 24-hour period.
    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.
    f. Option: Test ductile-iron piping according to AWWA C600, "Hydrostatic Testing" Section. Use test pressure of at least 10 psig (69 kPa).

6. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:

a. Option: Test plastic gravity sewer piping according to ASTM F 1417.
b. Option: Test concrete gravity sewer piping according to ASTM C 924 (ASTM C 924M).

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.

END OF SECTION 221313

SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.

B. Related Section:

1. Section 221313 "Facility Sanitary Sewers" for sanitary sewerage piping and structures outside the building.

1.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For waste and vent piping, 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. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 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.

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.

2.2 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. CISPI, Hubless-Piping Couplings:

1. Charlotte Pipe and Foundry Company or approved equal.
2. Standards: ASTM C 1277 and CISPI 310.
3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

C. Heavy-Duty, Hubless-Piping Couplings:

1. Charlotte Pipe and Foundry Company or approved equal.
2. Standards: ASTM C 1277 and ASTM C 1540.
3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.3 PVC PIPE AND FITTINGS

A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

B. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

C. Adhesive Primer: ASTM F 656.

1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesive primer 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."

D. Solvent Cement: ASTM D 2564.

1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Solvent cement shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
3. Unshielded, Nonpressure Transition Couplings:

    a. Mission Rubber Company, LLC; a division of MCP Industries or approved equal.
    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. 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.

4. Shielded, Nonpressure Transition Couplings:
    a. Mission Rubber Company, LLC; a division of MCP Industries or approved equal.
    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.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless

deviations to layout are approved on 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 at indicated slopes.

F. Install piping free of sags and bends.

G. Install fittings for changes in direction and branch connections.

H. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

I. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

J. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

K. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 2 percent downward in direction of flow for piping NPS 4 and larger.
2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

L. 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."

M. Install underground ABS and PVC piping according to ASTM D 2321.

N. Plumbing Specialties:

1. Install backwater valves in sanitary waste gravity-flow piping. Comply with requirements for backwater valves specified in Section 221319 "Sanitary Waste Piping Specialties."
2. Install cleanouts at grade and extend to where building sanitary drains connect to building

sanitary sewers in sanitary drainage gravity-flow piping. Comply with requirements for cleanouts specified in Section 221319 "Sanitary Waste Piping Specialties."

3. Install drains in sanitary drainage gravity-flow piping. Comply with requirements for drains specified in Section 221319 "Sanitary Waste Piping Specialties."

O. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

P. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

Q. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

R. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

B. 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. 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 OD's.
2. In Drainage Piping: Shielded, nonpressure transition couplings.

3.5 VALVE INSTALLATION

A. 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 221319 "Sanitary Waste Piping Specialties."

3.6 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration

and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "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. 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. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.

3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. 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. Comply with requirements for backwater valves cleanouts and drains specified in Section 221319 "Sanitary Waste Piping Specialties."
7. Equipment: Connect drainage piping as indicated. Provide shutoff valve if indicated and union for each connection. 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. Comply with requirements for identification specified in Section 220553 "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 drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water

to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.

4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. 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 drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

D. Exposed ABS and PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

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. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
2. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

C. Aboveground, soil and waste piping NPS 5 and larger shall be any of the following:

1. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
2. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

D. Aboveground, vent piping NPS 4 and smaller shall be any of the following:

1. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
2. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

E. Aboveground, vent piping NPS 5 and larger shall be any of the following:

1. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
2. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

F. Underground, soil, waste, and vent piping NPS 4 and smaller shall be any of the following:

1. Solid wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
2. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

G. Underground, soil and waste piping NPS 5 and larger] shall be any of the following:

1. Solid-wall PVC pipe; PVC socket fittings; and solvent-cemented joints.
2. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

END OF SECTION 221316

SECTION 221423 - STORM DRAINAGE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following storm drainage piping specialties:

1. Backwater valves.
2. Cleanouts.
3. Roof drains.
4. Miscellaneous storm drainage piping specialties.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

A. Downspout Boots

1. Description: ASTM A 74, Service class, hub-and-spigot, cast-iron soil pipe.
2. Size: Same as or larger than connected downspout.

B. Conductor Nozzles

1. Description: Bronze body with threaded inlet and bronze wall flange with mounting holes.
2. Size: Same as connected conductor.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.

B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4 (DN 100). Use NPS 4 (DN 100) for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet (15 m) for piping NPS 4 (DN 100) and smaller and 100 feet (30 m) for larger piping.
4. Locate at base of each vertical soil and waste stack.

C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

E. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions. Roof materials are specified in Division 07.

1. Install roof-drain flashing collar or flange so that there will be no leakage between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
2. Position roof drains for easy access and maintenance.

F. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.

G. Install conductor nozzles at exposed bottom of conductors where they spill onto grade.

H. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

3.3 FLASHING INSTALLATION

A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:

1. Lead Sheets: Burn joints of lead sheets 6.0-lb/sq. ft. (30-kg/sq. m), 0.0938-inch (2.4-mm) thickness or thicker. Solder joints of lead sheets 4.0-lb/sq. ft. (20-kg/sq. m), 0.0625-inch (1.6-mm) thickness or thinner.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches (250 mm), and skirt or flange extending at least 8 inches (200 mm) around pipe.

2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around sleeve.
3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around specialty.

C. Set flashing on floors and roofs in solid coating of bituminous cement.

D. Secure flashing into sleeve and specialty clamping ring or device.

3.4 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221423

SECTION 223300 - ELECTRIC, DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Commercial, electric, storage, domestic-water heaters.
   2. Thermostat-control, electric, tankless, domestic-water heaters.
   3. 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 Certificates: 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. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

1. Comply with efficiency requirements in ASHRAE 189.1, which supersede requirements in ASHRAE/IESNA 90.1.

C. ASME Compliance: Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61 Annex, "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.

b. Compression Tanks: Five years.

PART 2 - PRODUCTS

2.1 COMMERCIAL, ELECTRIC, DOMESTIC-WATER HEATERS

A. Commercial, Electric, Storage, Domestic-Water Heaters:

1. A.O. Smith or approved equal.
2. Standard: UL 1453.
3. Storage-Tank Construction: Non-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 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.

2.2 DOMESTIC-WATER HEATER ACCESSORIES

A. Domestic-Water Compression Tanks:

1. Flexcon or approved equal.
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 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: 2 gal. minimum.
c. Air Precharge Pressure: See plumbing plans for pressure.

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 or ASHRAE 90.2.

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 014000 "Quality Requirements" for retesting and re-inspecting requirements and Section 017300 "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. Comply with requirements for concrete bases specified in Section 033000 "Cast-in-Place Concrete."

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. 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 220523.12 "Ball Valves for Plumbing Piping," Section 220523.13 "Butterfly Valves for Plumbing Piping," and Section 220523.15 "Gate Valves for Plumbing Piping."

C. Install commercial, electric, domestic-water heaters with seismic-restraint devices. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

D. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

E. Install 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.

F. 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 221119 "Domestic Water Piping Specialties."

G. Install thermometers on outlet piping of electric, domestic-water heaters. Comply with requirements for thermometers specified in Section 220519 "Meters and Gages for Plumbing Piping."

H. 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 221119 "Domestic Water Piping Specialties."

I. Install piping-type heat traps on inlet and outlet piping of electric, domestic-water heater storage tanks without integral or fitting-type heat traps.

J. Fill electric, domestic-water heaters with water.

K. Charge domestic-water compression tanks with air.

3.2 CONNECTIONS

A. Comply with requirements for piping specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to electric, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.3 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and re-inspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.

C. Prepare test and inspection reports.

END OF SECTION 223300

SECTION 224213.13 - 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 and electronic sensors 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. Toto or approved equal.
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: Handicapped/elderly, complying with ICC/ANSI A117.1.
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: ASTM A 1045 or ASME A112.4.3.
4. Flushometer Valve: See plumbing sheets.

5. Toilet Seat: See plumbing sheets.

2.2 WALL-MOUNTED WATER CLOSETS

A. Water Closets: Wall mounted, top spud, accessible.

1. Toto or approved equal.
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.

3. Flushometer Valve: See plumbing sheets.
4. Toilet Seat: See plumbing sheets.
5. Support: See plumbing sheets.
6. Water-Closet Mounting Height: Handicapped/elderly according to ICC A117.1.

2.3 FLUSHOMETER VALVES

A. Lever-Handle, Diaphragm Flushometer Valves:

1. Toto or approved equal.
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 & Concealed.
9. Consumption: 1.28 gal. per flush.
10. Minimum Inlet: NPS 1.
11. Minimum Outlet: NPS 1-1/4.

B. Lever-Handle, Piston Flushometer Valves:

1. Toto or approved equal.
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 & concealed.

9. Consumption: 1.28 gal. per flush.
10. Minimum Inlet: NPS 1.
11. Minimum Outlet: NPS 1-1/4.

2.4 TOILET SEATS

A. Toilet Seats:

1. Crane or approved equal.
2. Standard: IAPMO/ANSI Z124.5.
3. Material: Plastic.
4. Type: Commercial (Heavy duty).
5. Shape: Elongated rim, open front.
6. Hinge: Self-sustaining, check.
7. Hinge Material: Noncorroding metal.
8. Seat Cover: Not required.
9. Color: White Insert color.

2.5 SUPPORTS

A. Water Closet Carrier:

1. JR Smith, Zurn or approved equal.
2. Standard: ASME A112.6.1M.
3. Description: Waste-fitting assembly, as required to match drainage piping material and arrangement with faceplates, couplings gaskets, and feet; bolts and hardware matching fixture.

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 220518 "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 079200 "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 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "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 224213.13

SECTION 224216.13 - 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 017823 "Operation and Maintenance Data," include the following:

a. Servicing and adjustments of automatic faucets.

PART 2 - PRODUCTS

2.1 VITREOUS-CHINA, WALL-MOUNTED LAVATORIES

A. Lavatory: Wheelchair, vitreous china, wall mounted.

1. Metcraft, Toto or approved equal.
2. Fixture:

a. Standard: ASME A112.19.2/CSA B45.1.
b. Type: Slab or wheelchair.
c. Nominal Size: Rectangular, 27 by 20 inches.

d. Faucet-Hole Punching: Three holes, 2-inch centers.
e. Faucet-Hole Location: Top.
f. Color: White.
g. Mounting: For concealed-arm carrier.

3. Faucet: See plumbing plans.
4. Support: Type II, concealed-arm lavatory carrier.
5. Lavatory Mounting Height: Handicapped/elderly according to ICC A117.1.

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. Symmons, American Standard or approved equal.
2. Standard: ASME A112.18.1/CSA B125.1.
3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
4. Body Type: See plumbing plans.
5. Body Material: Commercial, solid brass.
6. Finish: See plumbing plans.
7. Maximum Flow Rate: 0.5 gpm.
8. Maximum Flow: 0.25 gal. per metering cycle.
9. Mounting Type: See plumbing plans.
10. Valve Handle(s): Wrist blade, 4 inches Push button.
11. Spout: Rigid type.
12. Spout Outlet: Laminar flow.
13. Operation: Compression, manual.
14. Drain: McGuire Company or approved equal.

2.3 SUPPORTS

A. Type II Lavatory Carrier:

1. JR Smith, Zurn or approved equal.
2. Standard: ASME A112.6.1M.

2.4 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: Loose key.

F. Risers:

1. NPS 1/2.
2. ASME A112.18.6, braided- or corrugated-stainless-steel, flexible hose riser.

2.5 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, one-piece, cast-brass trap with swivel 0.029-inch-thick tubular brass wall bend; 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 220518 "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 079200 "Joint Sealants."

F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Section 220719 "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 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

A. After completing installation of lavatories, inspect and repair damaged finishes.

B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed lavatories and fittings.

D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

END OF SECTION 224216.13

SECTION 224216.16 - 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. Supply fittings.
8. Waste fittings.
9. Supports.

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, Terrazo, floor mounted.

1. Florestone or approved equal.
2. Fixture:

a. Standard: IAPMO/ANSI Z124.6.
b. Material: Cast polymer.
c. Nominal Size: Neo Angle type.
d. Tiling Flange: Not required.
e. Rim Guard: On front top surfaces.

f. Color: White.
g. Drain: Grid with NPS 3 outlet.

3. Mounting: On floor and flush to wall.
4. Faucet: See plumbing plans.

2.2 UTILITY SINKS

A. Utility Sinks: Stainless steel, counter mounted.

1. Elkay or approved equal.
2. Fixture:

a. Standard: ASME A112.19.3/CSA B45.4.
b. Type: Ledge back.
c. Number of Compartments: One.
d. Overall Dimensions: See plumbing plans.
e. Metal Thickness: 0.050 inch.
f. Compartment:

1) Dimensions: See plumbing plans.
2) Drain: Grid with NPS 1-1/2 tailpiece and twist drain.
3) Drain Location: Near back of compartment.

g. Each Compartment:

1) Dimensions: See plumbing plans.
2) Drains: Grid with NPS 2 tailpiece and twist drain.
3) Drain Location: Near back of compartment.

3. Faucet(s):

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: Loose key.
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.

2.3 HANDWASH SINKS

A. Handwash Sinks: Stainless steel, counter mounted.

1. Elkay or approved equal.
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: See plumbing plans.
4. Supply Fittings: Comply with requirements in "Supply Fittings" Article.
5. Waste Fittings: Comply with requirements in "Waste Fittings" Article.
6. Support: Type II sink carrier..
7. Mounting Height: Standard.

2.4 SINK FAUCETS

A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," 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. Elkay or approved equal.

2. General-Duty, Solid-Brass Faucets:

a. Elkay or approved equal.

3. Copper- or Brass-Underbody Faucets:

a. Elkay or approved equal.

4. Standard: ASME A112.18.1/CSA B125.1.

5. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and sink receptor.
6. Body Type: Centerset.
7. Body Material: Commercial, solid brass.
8. Finish: Chrome plated.
9. Maximum Flow Rate: 2.2 gpm.
10. Handle(s): Lever.
11. Mounting Type: Deck, exposed.
12. Spout Type: Swivel gooseneck.
13. Vacuum Breaker: Not required for hose outlet.
14. Spout Outlet: Aerator Spray.

2.5 LAMINAR-FLOW, FAUCET-SPOUT OUTLETS

A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for faucet-spout-outlet materials that will be in contact with potable water.

B. Elkay or approved equal.

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.

2.6 SUPPORTS

A. Type II Sink Carrier:

1. Zurn or approved equal.
2. Standard: ASME A112.6.1M.

2.7 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: Loose key.

F. Risers:

1. NPS 1/2.
2. Chrome-plated, soft-copper flexible tube.

2.8 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, one-piece, cast-brass trap with swivel 0.029-inch-thick tubular brass wall bend; 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 220523.12 "Ball Valves for Plumbing Piping" and Section 220523.15 "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 220518 "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 079200 "Joint Sealants."

H. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks. Comply with requirements in Section 220719 "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 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust 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 224216.16

SECTION 224713 - DRINKING FOUNTAINS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes drinking fountains and related components.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of drinking fountains.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For drinking fountains to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 DRINKING FOUNTAINS

A. Drinking Fountains: Stainless steel, wall mounted.

1. Stainless-Steel Drinking Fountains:

    a. Elkay, Haws or approved equal with outdoor rated bottle fill station.

2. Standards:

    a. Comply with ASME A112.19.3/CSA B45.4.
    b. Comply with NSF 61 Annex G.

3. Type Receptor: With back On horizontal support.
4. Receptor Shape: Rectangular.
5. Back Panel: Stainless-steel wall plate behind drinking fountain.
6. Bubblers: Two, with adjustable stream regulator, located on deck.
7. Maximum water flow: 0.5 gpm.
8. Control: Push button.
9. Drain: Grid type with NPS 1-1/4 tailpiece.
10. Supply Piping: NPS 3/8 with shutoff valve.
11. Drain Piping: ASME A112.18.2/CSA B125.2, NPS 1-1/4 chrome-plated brass P-trap and waste.
12. Support: Type I Water Cooler Carrier.
13. Drinking Fountain Mounting Height: Handicapped/elderly according to ICC A117.1.

2.2 SUPPORTS

A. Type I Water Cooler Carrier:

1. Standard: ASME A112.6.1M.

B. Type II Water Cooler Carrier:

1. Standard: ASME A112.6.1M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before fixture installation.

B. Examine walls and floors for suitable conditions where fixtures will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install fixtures level and plumb according to roughing-in drawings. For fixtures indicated for children, install at height required by authorities having jurisdiction.

B. Set pedestal drinking fountains on floor.

C. Install off-the-floor carrier supports, affixed to building substrate, for wall-mounted fixtures.

D. Install water-supply piping with shutoff valve on supply to each fixture to be connected to domestic-water distribution piping. Use ball or gate valve. Install valves in locations where they can be easily reached for operation. Valves are specified in Section 220523.12 "Ball Valves for Plumbing Piping" and Section 220523.15 "Gate Valves for Plumbing Piping."

E. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.

F. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

G. Seal joints between fixtures and walls using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

H. Adjust fixture flow regulators for proper flow and stream height.

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Install ball or gate shutoff valve on water supply to each fixture. Comply with valve requirements specified in Section 220523.12 "Ball Valves for Plumbing Piping" and Section 220523.15 "Gate Valves for Plumbing Piping."

D. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 CLEANING

A. After installation, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.

C. Provide protective covering for installed fixtures.

D. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 224713

SECTION 230553 - 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.

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. Seton or equivalent.

2. Material and Thickness: Brass, 0.032-inch stainless steel, 0.025-inch aluminum, 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.
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.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch 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. Seton or equivalent

B. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch or 1/8 inch thick, and having predrilled holes for attachment hardware.

C. Letter Color: White.

D. Background Color: Black.

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.

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. Seton or equivalent.

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. Seton or equivalent.

B. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch or 1/8 inch thick, and having predrilled holes for attachment hardware.

C. Letter Color: White.

D. Background Color: Black.

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.

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.

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 099123 "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:

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.

C. Pipe Label Color Schedule:

1. Refrigerant Piping: White letters on a safety-black background.

3.4 DUCT LABEL INSTALLATION

A. Install self-adhesive duct labels with permanent adhesive on air ducts in the following color codes:

1. Blue: For cold-air supply ducts.
2. Yellow: For hot-air supply ducts.
3. Green: For exhaust-, outside-, relief-, return-, 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 230553

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Balancing Air Systems:

a. Constant-volume air 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.

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 Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

PART 2 - EXECUTION

2.1 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 strainers. Verify that startup screens have been replaced by permanent screens with indicated perforations.

K. Examine control valves for proper installation for their intended function of throttling, diverting, or mixing fluid flows.

L. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

M. Examine operating safety interlocks and controls on HVAC equipment.

N. 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.

2.2 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.

2.3 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", or 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 233300 "Air Duct Accessories."
3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "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.

2.4 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 233113 "Metal Ducts."

2.5 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 Construction Manager or commissioning authority 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.

2.6 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: Plus or minus 10 percent.
2. Air Outlets and Inlets: Plus or minus 10 percent.
3. Heating-Water Flow Rate: Plus or minus 10 percent.
4. Cooling-Water Flow Rate: Plus or minus 10 percent.

B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

2.7 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. Balancing stations.

4. Position of balancing devices.

E. Air-Handling-Unit Test Reports: For air-handling units 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, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

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:

1. Unit Data:

a. System and air-handling 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. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

2.8 VERIFICATION OF TAB REPORT

A. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of Construction Manager or commissioning authority.

B. Construction Manager or 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 or Architect may contact AABC Headquarters regarding the AABC National Performance Guaranty.

F. Prepare test and inspection reports.

2.9 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 230593

SECTION 230713 - 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, exposed supply and outdoor air.
3. Indoor, concealed return located in unconditioned space.
4. Indoor, exposed return located in unconditioned space.

B. Related Sections:

1. Section 233113 "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 I. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Certainteed or equal.

G. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation without factory-applied jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Certainteed or equal.

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. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Ductmate Industries, Inc. or equal.

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. Ductmate Industries, Inc. or equal.

D. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Ductmate Industries, Inc. or equal.

2.3 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. Ductmate Industries, Inc. or equal.
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. Ductmate Industries, Inc. or equal.
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.

2.4 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

1. Ductmate Industries, Inc. or equal.
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. Ductmate Industries, Inc. or equal.
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.

2.5 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.

2.6 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.

2.7 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. 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. Certainteed or equal.
2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White.

2.8 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Ductmate Industries, Inc. or equal.
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.

2.9 SECUREMENTS

A. Aluminum Bands: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal.

1. Spiral Manufacturing Co., Inc. or equal.

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. Spiral Manufacturing Co., Inc. or equal.
    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. Spiral Manufacturing Co., Inc. or equal.
    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. Spiral Manufacturing Co., Inc. or equal.
    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. Spiral Manufacturing Co., Inc. or equal.
    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. Spiral Manufacturing Co., Inc. or equal.

C. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.

D. Wire: 0.080-inch nickel-copper alloy.

1. Ductmate Industries, Inc. or equal.

2.10 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 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 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. 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. 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. Seal penetrations through fire-rated assemblies.

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.

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 over compress 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 manufacturers 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 078413 "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 099113 "Exterior Painting" and Section 099123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. 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, 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density.

B. Concealed, Return-Air Duct and Plenum Insulation: Mineral-fiber blanket, 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density.

END OF SECTION 230713

SECTION 232300 - 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.

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 88, Type K or L.

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. Body and Bonnet: Forged brass or cast bronze; globe design with straight-through or angle pattern.
2. Diaphragm: Phosphor bronze and stainless steel with stainless-steel spring.
3. Operator: Rising stem and hand wheel.
4. Seat: Nylon.
5. End Connections: Socket, union, or flanged.
6. Working Pressure Rating: 500 psig.
7. Maximum Operating Temperature: 275 deg F.

B. Packed-Angle Valves:

1. Body and Bonnet: Forged brass or cast bronze.
2. Packing: Molded stem, back seating, and replaceable under pressure.
3. Operator: Rising stem.
4. Seat: Nonrotating, self-aligning polytetrafluoroethylene.
5. Seal Cap: Forged-brass or valox hex cap.
6. End Connections: Socket, union, threaded, or flanged.
7. Working Pressure Rating: 500 psig.
8. Maximum Operating Temperature: 275 deg F.

C. Check Valves:

1. Body: Ductile iron, forged brass, or cast bronze; globe pattern.

2. Bonnet: Bolted ductile iron, forged brass, or cast bronze; or brass hex plug.
3. Piston: Removable polytetrafluoroethylene seat.
4. Closing Spring: Stainless steel.
5. Manual Opening Stem: Seal cap, plated-steel stem, and graphite seal.
6. End Connections: Socket, union, threaded, or flanged.
7. Maximum Opening Pressure: 0.50 psig.
8. Working Pressure Rating: 500 psig.
9. Maximum Operating Temperature: 275 deg F.

D. Service Valves:

1. Body: Forged brass with brass cap including key end to remove core.
2. Core: Removable ball-type check valve with stainless-steel spring.
3. Seat: Polytetrafluoroethylene.
4. End Connections: Copper spring.
5. Working Pressure Rating: 500 psig.

E. Solenoid Valves: Comply with AHRI 760 and UL 429; listed and labeled by a National Recognized Testing Laboratory (NRTL).

1. Body and Bonnet: Plated steel.
2. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
3. Seat: Polytetrafluoroethylene.
4. End Connections: Threaded.
5. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch conduit adapter, and**208**-V ac coil.
6. Working Pressure Rating: 400 psig.
7. Maximum Operating Temperature: 240 deg F.

F. Thermostatic Expansion Valves: Comply with AHRI 750.

1. Body, Bonnet, and Seal Cap: Forged brass or steel.
2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
3. Packing and Gaskets: Non-asbestos.
4. Capillary and Bulb: Copper tubing filled with refrigerant charge.
5. Suction Temperature: 40 deg F.
6. Superheat: Adjustable.
7. Reverse-flow option (for heat-pump applications).
8. End Connections: Socket, flare, or threaded union.
9. Working Pressure Rating: 700 psig.

G. Hot-Gas Bypass Valves: Comply with UL 429; listed and labeled by an NRTL.

1. Body, Bonnet, and Seal Cap: Ductile iron or steel.
2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
3. Packing and Gaskets: Non-asbestos.
4. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
5. Seat: Polytetrafluoroethylene.
6. Equalizer: Internal.
7. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch conduit adapter and 208-V ac coil.

8. End Connections: Socket.
9. Throttling Range: Maximum 5 psig.
10. Working Pressure Rating: 500 psig.
11. Maximum Operating Temperature: 240 deg F.

H. Straight-Type Strainers:

1. Body: Welded steel with corrosion-resistant coating.
2. Screen: 100-mesh stainless steel.
3. End Connections: Socket or flare.
4. Working Pressure Rating: 500 psig.
5. Maximum Operating Temperature: 275 deg F.

I. Angle-Type Strainers:

1. Body: Forged brass or cast bronze.
2. Drain Plug: Brass hex plug.
3. Screen: 100-mesh monel.
4. End Connections: Socket or flare.
5. Working Pressure Rating: 500 psig.
6. Maximum Operating Temperature: 275 deg F.

J. Moisture/Liquid Indicators:

1. Body: Forged brass.
2. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.
3. Indicator: Color coded to show moisture content in parts per million (ppm).
4. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.
5. End Connections: Socket or flare.
6. Working Pressure Rating: 500 psig.
7. Maximum Operating Temperature: 240 deg F.

K. Replaceable-Core Filter Dryers: Comply with AHRI 730.

1. Body and Cover: Painted-steel shell with ductile-iron cover, stainless-steel screws, and neoprene gaskets.
2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
3. Desiccant Media: Activated alumina.
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.

L. Permanent Filter Dryers: Comply with AHRI 730.

1. Body and Cover: Painted-steel shell.
2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.

3. Desiccant Media: Activated alumina.
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.

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 brazed 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 brazed joints.

C. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications: Copper, Type K (A), annealed- or drawn-temper tubing and wrought-copper fittings with brazed joints.

D. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications: Copper, Type ACR, drawn-temper tubing and wrought-copper fittings with 95-5 tin-antimony soldered joints.

E. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications: Copper, Type ACR, drawn-temper tubing and wrought-copper fittings with Alloy HB soldered joints.

F. Safety-Relief-Valve Discharge Piping: Copper, Type ACR, annealed- or drawn-temper tubing and wrought-copper fittings with brazed joints.

G. Safety-Relief-Valve Discharge Piping: Copper, Type K (A), annealed- or drawn-temper tubing and wrought-copper fittings with brazed joints.

H. Safety-Relief-Valve Discharge Piping: Copper, Type ACR, drawn-temper tubing and wrought-copper fittings with 95-5 tin-antimony soldered joints.

I. Safety-Relief-Valve Discharge Piping: Copper, Type ACR, drawn-temper tubing and wrought-copper fittings with Alloy HB soldered joints.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss,

expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

B. Install refrigerant piping according to ASHRAE 15.

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping adjacent to machines to allow service and maintenance.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Select system components with pressure rating equal to or greater than system operating pressure.

J. 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 083113 "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 230553 "Identification for HVAC Piping and Equipment."

R. Install sleeves for piping penetrations of walls, ceilings, and floors.

S. Install sleeve seals for piping penetrations of concrete walls and slabs.

T. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.3 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. 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.

D. Support multifloor vertical runs at least at each floor.

3.4 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.

3.5 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.

3.6 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 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 232300

SECTION 233113 - 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 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible 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 ASCE/SEI 7. 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 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.

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. Lighting fixtures.
    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 D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. 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/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 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.

1. McGrill Airflow LLC. Or equal.

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: 4 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.

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.

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 for10-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. Mason Industries, Inc., or equal.

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 round 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 233300 "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 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 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.

3.3 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.

3.4 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.

3.5 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 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 233300 "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.

3.7 START UP

A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.8 DUCT SCHEDULE

A. Supply Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:

    a. Pressure Class: Positive 2-inch wg.
    b. Minimum SMACNA Seal Class: C.
    c. SMACNA Leakage Class for Rectangular: 24.
    d. SMACNA Leakage Class for Round and Flat Oval: 12.

2. Ducts Connected to Equipment Not Listed Above:

    a. Pressure Class: Positive 2-inch wg.
    b. Minimum SMACNA Seal Class: B.
    c. SMACNA Leakage Class for Rectangular: 12.
    d. SMACNA Leakage Class for Round and Flat Oval: 6.

B. Return Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:

    a. Pressure Class: Positive or negative 2-inch wg.
    b. Minimum SMACNA Seal Class: C.
    c. SMACNA Leakage Class for Rectangular: 24.
    d. SMACNA Leakage Class for Round and Flat Oval: 12.

2. Ducts Connected to Equipment Not Listed Above:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: B.
c. SMACNA Leakage Class for Rectangular: 12.
d. SMACNA Leakage Class for Round and Flat Oval: 6.

C. 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: C if negative pressure, and A if positive pressure.
c. SMACNA Leakage Class for Rectangular: 24.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

2. Ducts Connected to Equipment Not Listed Above:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: B 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.

D. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel.
2. PVC-Coated Ducts:

a. Exposed to Airstream: Match duct material.
b. Not Exposed to Airstream: Match duct material.

3. Stainless-Steel Ducts:

a. Exposed to Airstream: Match duct material.
b. Not Exposed to Airstream: Match duct material.

4. Aluminum Ducts: Aluminum.

E. 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.

F. 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 233113

SECTION 233300 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manual volume dampers.
2. Turning vanes.
3. Flexible ducts.
4. Duct accessory hardware.

B. Related Requirements:

1. Section 233723 "HVAC Gravity Ventilators" for roof-mounted ventilator caps.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

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. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a finish for concealed ducts and finish for exposed ducts.

C. Aluminum Sheets: Comply with ASTM B 209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.

D. Extruded Aluminum: Comply with ASTM B 221, Alloy 6063, Temper T6.

E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

F. 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 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:

1. Standard leakage rating, with linkage outside airstream.
2. Suitable for horizontal or vertical applications.
3. 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.

4. 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.

5. Blade Axles: Galvanized steel.
6. Bearings:

    a. Oil-impregnated bronze.
    b. 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.

7. 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.

2.4 TURNING VANES

A. 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.

B. 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.

C. 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."

D. Vane Construction: Single wall.

2.5 DUCT-MOUNTED ACCESS DOORS

A. 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-inchbutt 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 18 Inches Square: Two hinges and two sash locks.
c. Access Doors up to 24 by 48 Inches: Three hinges and two compression latches.
d. Access Doors Larger Than 24 by 48 Inches: Four hinges and two compression latches with outside and inside handles.

2.6 FLEXIBLE CONNECTORS

A. Materials: Flame-retardant or noncombustible fabrics.

B. Coatings and Adhesives: Comply with UL 181, Class 1.

C. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 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.

D. 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.

2.7 FLEXIBLE DUCTS

A. Noninsulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire.

1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
2. Maximum Air Velocity: 4000 fpm.
3. Temperature Range: Minus 10 to plus 160 deg F.

B. Insulated, Flexible Duct: UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene vapor-barrier film.

1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
2. Maximum Air Velocity: 4000 fpm.
3. Temperature Range: Minus 20 to plus 210 deg F.
4. Insulation R-value: Comply with ASHRAE/IESNA 90.1.

C. Flexible Duct Connectors:

1. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action in sizes 3 through 18 inches, to suit duct size.
2. Non-Clamp Connectors: Adhesive.

2.8 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 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.

D. Set dampers to fully open position before testing, adjusting, and balancing.

E. Install test holes at fan inlets and outlets and elsewhere as indicated.

F. 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 and downstream from duct filters.
3. At outdoor-air intakes and mixed-air plenums.
4. At drain pans and seals.
5. Downstream from manual volume 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.

G. Install access doors with swing against duct static pressure.

H. 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.

I. Label access doors according to Section 230553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.

J. Install flexible connectors to connect ducts to equipment.

K. Connect terminal units to supply ducts directly or with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.

L. Connect diffusers or light troffer boots to ducts directly or with maximum 60-inch lengths of flexible duct clamped or strapped in place.

M. Connect flexible ducts to metal ducts with adhesive.

N. 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. Inspect turning vanes for proper and secure installation.

END OF SECTION 233300

SECTION 233713.13 - AIR DIFFUSERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rectangular and square ceiling diffusers.
2. Linear slot diffusers.

B. Related Requirements:

1. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers.
2. Section 233713.23 "Air Registers and Grilles" for adjustable-bar register and grilles, fixed-face registers and grilles, and linear bar grilles.

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 the following:

1. Krueger or approved equal.

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.

F. Face Style: Four cone.

G. Mounting: Surface and T-bar.

H. Pattern: Adjustable. See plans for pattern.

I. Dampers: Radial opposed blade.

2.2 LINEAR SLOT DIFFUSERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Krueger or approved equal.

B. Devices shall be specifically designed for variable-air-volume flows.

C. Material - Shell: Steel,

D. Finish: Baked enamel, white.

E. Slot Width: 1/2 inch.

F. Number of Slots: Four.

G. Length: 84 inches.

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 shown on plans, 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 233713.13

SECTION 233713.23 - AIR REGISTERS AND GRILLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Adjustable blade face grilles.
2. Fixed face registers and grilles.

B. Related Requirements:

1. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to registers and grilles.
2. Section 233713.13 "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. Krueger or approved equal.
2. Material: Steel.
3. Finish: Baked enamel, color selected by Architect.
4. Face Blade Arrangement: Horizontal spaced 3/4 inch apart.
5. Face Arrangement: Snap in modular core.
6. Core Construction: Removable.

2.2 GRILLES

A. Adjustable Blade Face Grille:

1. Krueger or approved equal.
2. Material: Steel.
3. Finish: Baked enamel, color selected by Architect.
4. Face Blade Arrangement: Horizontal spaced 1/2 inch apart.
5. Core Construction: Integral.
6. Rear-Blade Arrangement: Vertical spaced 1/2 inch apart.

B. Fixed Face Grille:

1. Krueger or approved equal.
2. Material: Steel.
3. Finish: Baked enamel, color selected by Architect.
4. Face Blade Arrangement: see plans.
5. Frame: see plans.

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 shown on plans, 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 233713.23

SECTION 233723 - HVAC GRAVITY VENTILATORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Gravity ventilators.

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.

1.4 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.

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.

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.

F. Label gravity ventilators according to requirements specified in Section 230553 "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 233723

SECTION 238126 - 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: Sample of special warranty.

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/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 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: Five year(s) from date of Substantial Completion.
b. For Parts: Five year(s) from date of Substantial Completion.
c. For Labor: One year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Carrier or equal.

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. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
6. Fan Motors:

a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements.
b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
c. Wiring Terminations: Connect motor to chassis wiring with plug connection.

7. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
8. Filters: Permanent, cleanable.
9. 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 2 inches deep.

b. Single-wall, galvanized-steel sheet.
c. Double-wall, galvanized-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 3/4 inches.

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. 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.
4. 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.
5. Fan: Direct drive, centrifugal.
6. Fan Motors:

a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements.
b. Multitapped, multispeed with internal thermal protection and permanent lubrication.

7. Air Filtration Section:

a. General Requirements for Air Filtration Section:

1) Comply with NFPA 90A.
2) Minimum Arrestance and 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.

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. Fan: Direct drive, centrifugal.
4. Fan Motors:

a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements.
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.

5. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
6. 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, galvanized-steel sheet.
c. Double-wall, galvanized-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 3/4 inches.

e. Pan-Top Surface Coating: Asphaltic waterproofing compound.

7. Air Filtration Section:

a. General Requirements for Air Filtration Section:

1) Comply with NFPA 90A.
2) Minimum Arrestance: According to ASHRAE 52.2 and 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.

2.3 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 Charge: 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.

2.5 CAPACITIES AND CHARACTERISTICS

A. Cooling Capacity:

1. Total: Refer to equipment schedule.
2. Sensible: Refer to equipment schedule.
3. SEER: Refer to equipment schedule.
4. EER: Refer to equipment schedule.
5. Moisture Removal: Refer to equipment schedule.
6. Entering-Air Temperature:

    a. Dry Bulb: Refer to equipment schedule.
    b. Wet Bulb: Refer to equipment schedule.

7. Leaving-Air Temperature:

    a. Dry Bulb: Refer to equipment schedule.
    b. Wet Bulb: Refer to equipment schedule.

B. Heating Capacity:

1. Type: Heat pump.
2. Total Capacity: Refer to equipment schedule.
3. Air-Temperature Rise: Refer to equipment schedule.
4. Coefficient of Performance: Refer to equipment schedule.
5. Heating Season Performance Factor: Refer to equipment schedule.

C. Indoor Unit:

1. Fan Motor Electrical Characteristics:

    a. Volts: 208.
    b. Phase: Single.
    c. Hertz: 60.

2. Airflow: Refer to equipment schedule.

D. Outdoor Unit:

1. Type: Air cooled.
2. Electrical Characteristics:

    a. Volts: 208.
    b. Phase: Single.
    c. Hertz: 60.
    d. Minimum Circuit Ampacity: Refer to equipment schedule.
    e. Maximum Overcurrent Protection: Refer to equipment schedule.
    f. Fan Motor Full-Load Amperes: Refer to equipment schedule.
    g. Compressor Full-Load Amperes: Refer to equipment schedule.

h. Compressor Locked-Rotor Amperes: Refer to equipment schedule.

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. Equipment Mounting:

1. Install ground-mounted, compressor-condenser components on cast-in-place concrete equipment base(s).
2. Install ground-mounted, compressor-condenser components on polyethylene mounting base.

D. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

A. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.

B. Duct Connections: Duct installation requirements are specified in Section 233113 "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 233300 "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. Train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION 238126

SECTION 26 05 00 - BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general conditions and Division 1 are part of this section and the contract for this work and apply to this section as fully as if repeated herein. This section, 26 05 00, applies to all Division 26 categories.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 EXPLANATION OF DRAWINGS

A. These construction documents are intended to be diagrammatic and reflect the scope, quality, and character of the work to be performed; all miscellaneous materials and work required for a complete and operational system, though not specifically mentioned, shall be furnished and installed by the Contractor.

B. The Contractor shall confirm sizes, dimensions, weights and locations of all devices, light fixtures, and equipment prior to installation. Dimensioned architectural drawings shall take precedence over diagrammatic layouts shown on these contract documents.

C. The specifications and the drawings are an integral document and shall be considered complementary to each other. In the case of a conflict between the specifications and the drawings, the more constricting condition shall be enforced.

D. The Contractor shall be responsible for reporting any discrepancies, errors, or omissions noted prior to bid.

E. It is the intent of the drawings to indicate schematic routing and placement of devices, fixtures, equipment and conduit. Equipment or devices requiring a precise location shall be dimensioned on other trade documents (architectural, mechanical, etc.). Offsets, elbows, or extensions shall be furnished and installed by the Contractor as necessary to avoid structure, piping, and clearances and to provide a complete and workmanlike installation.

1.3 QUALITY ASSURANCE

A. All work, material or equipment shall comply with the codes, ordinances and regulations of the local government having jurisdiction, including the regulations of serving utilities and any participating government agencies having jurisdiction.

B. All electrical work shall comply with the latest edition under enforcement, including all amendments, modifications and supplements, of the following codes and standards or other regulations which may apply:

1. American Disabilities Act (ADA)
2. American National Standards Institute (ANSI)
3. American Society for Testing and Materials (ASTM)
4. Institute of Cable Engineers Association (ICEA)

5. Institute of Electrical and Electronic Engineers (IEEE)
6. Local Code Enforcement Agency Requirements
7. National Electrical Code (NEC)
8. National Electrical Contractor's Association (NECA)
9. National Electrical Manufacturer's Association (NEMA)
10. National Electrical Testing Association (NETA)
11. National Fire Protection Association (NFPA)
12. Underwriters' Laboratories, Inc. (UL)
13. International Building Code (IBC)

C. No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. Any conflicts or changes required to the contract documents in order to obtain compliance with applicable codes shall be brought to the immediate attention of the Engineer, Architect, and Owner's Representative by the Contractor.

D. All items shall be listed by Underwriter's Laboratories and shall bear the U.L. label.

E. Equipment shown to scale is approximate only and based upon a general class of equipment specified. The Contractor shall verify all dimensions and clearances prior to commencement of work.

F. The Contractor shall verify all points of connection with the manufacturer's requirements, instructions, or recommendations prior to installation. The actual dimensions, weights, clearance requirements and installation requirements shall be verified and coordinated by the Contractor.

1.4 SUBMITTALS

A. Shop drawings for materials, equipment, devices, fixtures, and systems shall be submitted by the Contractor for review within 30 days after award of the contract. In addition to the requirements for submittals stated herein, the Contractor shall be responsible for compliance with the requirements of Division 1.

B. The Contractor shall bear the responsibility for any materials installed which were not submitted for review or not installed in compliance with the review comments and the contract documents.

C. Verbal modification of submittal documents or changes to the requirements of the contract documents shall not be acceptable. All submittal material must be documented in a written format.

D. All submittal packages must be submitted at one time and in accordance with the specification section appropriate for the material. All packages must be identical and clearly labeled indicating the specification section, project name, submittal date, Contractor's name, Engineer's name, preparer's name and submission version (first submission, resubmittal #1, etc.).

E. Product catalog cutsheets and descriptive literature shall be cross-referenced to the specification section by paragraph.

F. All submittal packages shall be permanently bound in brochure or booklet format. A minimum quantity of six (6) submittal booklets shall be provided by the Contractor; additional printed copies may be required if so noted. Electronic copies of completed submittal packages, furnished on a CD-ROM in pdf format, may be furnished in lieu of printed copies.

G. Materials which bear a certification or approval of a testing agency, performance criteria, society, agency, of other organization shall be submitted with all labels identified.

H. The submittal shall be complete and with catalog data and information properly marked to show, among other things, materials, capacity and performance data to meet the specified requirements.

I. Incomplete submittals will be rejected at the discretion of the reviewing Engineer.

J. Review of the submittal is only for general conformance with the contract documents. The Contractor is responsible for confirmation and coordination of dimensions, quantities, sizes, fabrication, installation methods, and for coordination of work of other trades with electrical work.

K. Detailed working drawings shall be prepared and submitted showing items which are to be fabricated including transformer mounting racks, unistrut mounting frames, equipment room layouts, pull boxes, splice boxes, gutters, etc.

L. Minimum scale for submitted drawings shall be 1/8". Details shall be drawn to 1/4" scale. All drawings shall be 8.5"x11" or larger.

M. Submittal brochures shall be complete and descriptive of the type, make, manufacturer, application, quantity, performance, capacity, ratings, options, dimensions, clearances, weights, nameplate data, special installation requirements, mounting method, NEMA type, NEMA class, environmental restrictions, layout requirements or other information as may be necessary for review of the material.

N. Submittal brochures for switchgear shall include, as a minimum, the following: singleline diagrams; fault current ratings of buses and devices; device identification, ratings, layout and characteristics; dimensions; circuit identification; identification label type and method of affixing; mounting; conduit entry point and quantities; NEMA enclosure type; and additional data as required for a complete review.

O. Submittal brochures for lighting systems shall include, as a minimum, the following: manufacturer; detailed drawing or photograph; dimensions; lamp data; ballast data; certified photometric data from a third-party testing agency; U.L. label listing; fixture number or identification from the drawings; finish color and material; mounting equipment; socket type and rating; environmental ratings (damp location, watertight, explosion-proof, etc.); voltage; input wattage; and additional information as necessary for a complete review.

P. The Contractor shall be responsible for all aspects of substitutions of material including any additional cost or delay incurred as a result of the substitution. The Contractor shall coordinate all substitutions with other trades, verify code compliance, verify clearances, photometric performance, appearance, suitability, constructability, and availability of the material prior to submitting the substitution for review. The Contractor shall bear the responsibility of any increased costs to other trades which are directly related to the substitution.

1.5 MATERIAL HANDLING

A. The Contractor shall deliver all equipment and material to the site in the manufacturer's original packaging without seals broken.

B. The Contractor shall handle, store, protect, and unpack all equipment and materials in accordance with the manufacturer's recommendations.

C. The Contractor shall inspect the equipment and materials in a timely manner to ensure the completeness and appropriateness of the shipment.

D. The Contractor shall immediately replace damaged or defective equipment or materials with identical new equipment or material at no cost, inconvenience, or delay to the Owner.

1.6 EXISTING CONDITIONS

A. The Contractor shall verify all existing conditions prior to bid and include all costs associated with the existing conditions in bid.

B. The Contractor shall match the finish and appearance of all existing conditions where constructing new work adjacent to existing surfaces or equipment.

C. Coordinate with the Owner's Representative for all ongoing projects or the work of other trades which may affect the Contractor's work. Verify Owner schedule requirements for special or standard events which may impact the Contractor's work.

D. Coordinate work to be performed in occupied areas and comply with the Owner's requirements such that the Owner's work or ongoing activities are not disrupted by the Contractor. Verify the need for work to be performed during premium hours, evenings, weekends, or holidays prior to bid and include all costs in bid. Bring to the Owner's attention the need and locations for all disruptive work prior to commencement of work.

1.7 UTILITY COMPANY REQUIREMENTS

A. The contractor shall contact the serving utility company for all utility system requirements prior to commencement of work. Utility work shall include electric power, telephone, data, fiber optic cable, cable television or other utilities as may require connections as a part of this contract. Coordinate and comply with all serving utility company requirements, designs, and schedules.

B. The utility information depicted on the contract documents is for bidding purposes only and shall not be used for construction purposes. All construction shall be performed according to engineered documents provided by the serving utility company. The Contractor shall obtain and coordinate with utility company requirements as a part of this contract and furnish and install all work as a part of this contract.

C. Verify all connection points, routing, and requirements with the serving utility company prior to commencement of work and coordinate final requirements with other trades.

D. The Contractor shall be responsible for all costs associated with failure to contact or coordinate with utility company requirements.

1.8 TEMPORARY CONSTRUCTION UTILITY REQUIREMENTS

A. Power, telephone or other temporary construction utility services required by the Contractor shall be the responsibility of the Contractor.

B. Arrangements for temporary construction utility services shall be made by the Contractor in coordination with the Owner's Representative and the serving utility company.

1.9 CONTINUITY OF SERVICE

A. The Contractor shall coordinate all shutdowns, outages, and service interruptions with the Owner's Representative. Electrical shutdowns shall be kept to the minimum number necessary to complete the work.

B. The Contractor shall coordinate all work done on overtime or premium time with Owner's Representative prior to commencement of work.

C. All work performed in or through occupied spaces, or other work disruptive to existing occupants shall be considered as performed during premium time or as overtime for the purposes of the bid; include all costs in bid.

D. The Contractor shall notify Owner's Representative of all shutdowns or disruptive work a minimum of 72 hours prior to commencement of work. The Contractor shall obtain written approval from the Owner's Representative prior to commencement of work.

E. The Contractor shall provide all necessary temporary power, including temporary power generation, to accommodate shutdowns and minimize disruption of the Owner's activities.

F. The Owner reserves the right to provide emergency repairs or temporary power to maintain service continuity at the Contractor's cost in the event Contractor fails to provide adequate service continuity.

1.10 RECORD DOCUMENTS

A. The Contractor shall prepare as-built documents depicting all revisions to branch circuits, conduit routing, equipment, panel schedules, lighting control schedules, or materials. Drawings shall be in AutoCAD .dwg format and Adobe .pdf formats. Contractor shall provide (1) full-size hard copy print and (1) CD-ROM of all as-built drawings and files. Hand-drawn or "red-line" drawings shall not be accepted. Drawings shall be legible, reproducible, and properly identified such they may be used as a reference for maintenance or construction.

B. The Contractor shall provide a minimum of three copies of the operation and maintenance manuals to the Owner's Representative at the completion of the project. Each copy shall be bound in a three-ring binder and labeled indicating: the project name; system name; Contractor's name, telephone number, and contact person; and Owner's name. The Contractor shall provide the following minimum information within each manual:

1. List of the Subcontractors performing work on the system including contact names, telephone numbers, and email addresses.
2. Routine and emergency service contact names, telephone numbers, and email addresses for each system.
3. Description of system operation.
4. Single line diagrams and control wiring diagrams.
5. Detailed product literature with technical information.
6. Local factory representative contact name, telephone number, and email address.
7. Sequence of starting, shutdown and operation.
8. Installation instructions and safety requirements.
9. Maintenance schedule, testing instructions and performance parameters.
10. Parts list including recommended spare parts.

1.11 GUARANTEE

A. All electrical work, materials and equipment provided under this contract shall be guaranteed for a period of one year from the date of acceptance of the work by the Owner. Any failures, problems, or deficiencies experienced during this period due to defective materials or faulty workmanship shall be immediately corrected by the Contractor without cost to the Owner. The Contractor shall be responsible for all damages to the Owner's facility, production, or work product due to deficiencies in the electrical system. Equipment guarantees in excess of one year shall not be superseded by this guarantee.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials shall be new, of prime quality, listed as suitable for the application, and bear factory-applied U.L. labels.

B. Materials shall be currently in production and shall be supported by spare parts, repair service, maintenance, and factory technical support.

C. Materials of one assembly (switchboards, substations, motor control centers, etc.) shall be of one manufacturer unless specifically stated otherwise in the contract documents.

PART 3 - EXECUTION

3.1 INSTALLATION REQUIREMENTS

A. All work shall conform to National Electrical Contractors Association standards of installation and the requirements of the manufacturer, Division 1, Division 26, and the Owner's Representative.

B. The Contractor shall field-verify all dimensions and coordinate dimensions with equipment sizes and locations.

C. The Contractor shall coordinate and install all penetrations, openings, slots, chases, or sleeves as necessary for the routing and installation of raceways, conductors, or equipment. The Contractor shall provide approved fire sealant to maintain fire ratings at all penetrations.

D. The Contractor shall coordinate the placement and sequence of installation of all mounting bolts, conduits, sleeves, etc. which are to be set in poured-in-place concrete slabs, concrete walls, and post-tension slabs per the structural drawings.

E. The Contractor shall verify and coordinate all equipment points of connection, voltages, wiring requirements, disconnecting means, fuse sizes, overcurrent protection, etc. with the equipment supplier. The Contractor shall immediately notify the Engineer of any discrepancies with the construction documents.

F. The Contractor shall install access panels in walls or ceilings in coordination with the Architect for all junction boxes or electrical equipment that require access.

G. All equipment shall be installed plumb, parallel, or orthogonal to structure and in a neat orderly fashion. All material shall be accessible for maintenance, inspection, servicing or replacement.

H. Verify final locations of devices, equipment, and fixtures during the rough-in phase with dimensioned architectural drawings, fabrication drawings, or other space planning requirements included in the contract documents.

I. The Contractor shall coordinate and arrange for the proper sequence of construction including scheduling of long-lead items, shutdowns, work of other trades, and Owner-scheduled events.

J. The Contractor shall provide adequate and qualified supervision for the work performed; no work shall be performed without the supervision of a representative of the Contractor.

K. The Contractor shall coordinate and cooperate with all other trades for a successful completion of the project.

3.2 SEISMIC BRACING

A. The Contractor shall seismically brace all equipment in accordance with requirements of the California Code of Regulations, Title 24, Seismic Design Category D and provide certification of seismic compliance upon request, including structural calculations as required.

3.3 CUTTING AND PATCHING

A. The Contractor shall provide cutting and patching as required to install the electrical system in this contract.

B. Coordinate the schedule of all cutting such that the work may be performed in an expeditious manner with minimum inconvenience to the Owner.

C. Remove or cut structures or materials as necessary for demolition prior to the installation of new electrical work.

D. The Contractor shall protect all surfaces, structure, furnishings, and finishes not directly affected by cutting or patching.

E. Provide dust and moisture barriers as required during cutting and prior to patching openings.

F. All penetrations through roofs shall be performed per architectural requirements, including compliance with the roofing manufacturers' requirements.

G. Patching shall be performed with materials which exactly match the adjacent surfaces in color, texture, character, and appearance.

H. All patches must maintain the fire ratings of the original surface and shall be sealed with a U.L. listed and Fire Marshal approved sealant.

3.4 COMMISSIONING

A. The Contractor shall initiate start up of all electrical equipment including operation of all devices, switches, generators, transfer switches, overcurrent protection, disconnect switches, etc. to verify normal operation of all moving parts and electrical performance.

B. The Contractor shall test, adjust, aim, align, label, clean and complete all systems prior to acceptance by the Owner's Representative.

C. The Contractor shall demonstrate that all systems operate within the manufacturer's recommended performance characteristics, the electrical construction documents, system requirements, and Owner requirements.

D. The Contractor shall test each system per the manufacturer's requirements and shall perform the following system tests:

1. Inspect cables for physical damage and proper connection.
2. Torque test cable connection and tighten in accordance with termination manufacturers recommendations.
3. Infrared scan all connections under loaded conditions and provided color printed images.
4. Insulation resistance test of each cable.
5. Inspect ground system connections.
6. Voltage drop tests on the main grounding electrode of system.

7. Determine the ground resistance between the main grounding system and all major electrical equipment frames, system neutral points.
8. Check rated voltage and phase balance at all equipment, motors and selected devices at full load conditions. Measure no load voltage conditions at each location.
9. Furnish all material, equipment, instruments and labor as required to complete testing.
10. Provide all test results properly bound in a three-ring binder.

3.5 TRAINING

A. Furnish at least one copy operating instructions from the manufacturer for all electrical equipment to the Owner's Representative. Instructions shall be clean, legible, and properly bound in a three-ring binder.

B. The Contractor shall provide training for the Owner’s staff as directed by the Owner's Representative for a minimum of one man-day (eight hours).

C. Provide classroom training by a qualified instructor for the operation, installation, and maintenance of designated equipment or systems including, but not limited to, generation systems, transfer switches, uninterruptible power supplies, energy management systems, lighting control systems, power distributions systems, and other systems which may require instruction.

3.6 CLEANING

A. Contractor shall clean all equipment, panelboard interiors, conduit interiors, fixtures, devices, etc. of all extraneous paint, drywall mud, overspray, dust, dirt, debris, trash, grease or markings. All cleaning shall be performed by the Contractor in accordance with the appropriate manufacturer’s recommendations.

END OF SECTION 26 05 00

SECTION 26 05 13 - MEDIUM VOLTAGE CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general conditions, Division 1, and Basic Electrical Requirements (Section 26 05 00) are part of this section and the contract for this work and apply to this section as fully as if repeated herein.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 QUALITY ASSURANCE AND STANDARDS

A. All work, material or equipment shall comply with the codes, ordinances and regulations of the local government having jurisdiction, including the regulations of serving utilities and any participating government agencies having jurisdiction.

B. All electrical work shall comply with the latest edition under enforcement, including all amendments, modifications and supplements, of the following codes and standards or other regulations which may apply:

1. American Disabilities Act (ADA)
2. American National Standards Institute (ANSI)
3. American Society for Testing and Materials (ASTM)
4. Institute of Cable Engineers Association (ICEA)
5. Institute of Electrical and Electronic Engineers (IEEE)
6. Local Code Enforcement Agency Requirements
7. National Electrical Code (NEC)
8. National Electrical Contractor's Association (NECA)
9. National Electrical Manufacturer's Association (NEMA)
10. National Electrical Testing Association (NETA)
11. National Fire Protection Association (NFPA)
12. Underwriters' Laboratories, Inc. (UL)
13. International Building Code (IBC)

No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. Any conflicts or changes required to the contract documents in order to obtain compliance with applicable codes shall be brought to the immediate attention of the Engineer, Architect, and Owner's Representative by the Contractor.

C. All items shall be listed by Underwriter’s Laboratories and shall bear the U.L. label.

1.3 SUBMITTALS

A. Submit shop drawings per Section 26 05 00 for review including the following:

1. Conductor materials
2. Connector and fitting materials

3. Installation materials and methods
4. Termination materials and methods

B. Complete data sheet for cable construction, shielding, insulation material, insulation rating, thickness of insulation, jacket cable stranding, voltage rating, and total amount of order in feet.

C. Certified test reports for:

1. Sample test on insulation: physical properties, solvent extraction, heat distortion, and accelerated water absorption.
2. Insulation resistance, power factor corona level, AC dielectric.
3. Certified Factory Test Report including the results of the test plus cable identification, factory order number, cable length and all cable specifications. No cable shall be installed in any duct or conduit until a related test report has been accepted by the Owner's Representative.
4. Field Test Report.
5. Submit a certification for the approval of the Owner's Representative containing the names and the qualifications of persons recommended to perform the splicing and termination of medium voltage cables approved for installation. Refer to Section 01400 including Exhibit A for certification requirements and information regarding cable installation termination and testing.
6. A complete test shall be done on each length of cable at the factory in accordance with ICEA S-68-516, and UL-1072. In addition, a corona test shall be done per AEIC CS6-97, Section E.
7. Complete cable pull-tension study. Study shall model the route of each conductor in 3-dimensions and shall indicate pull-tensions, conduit sidewall pressures, pulling rates, minimum bend radius, and suggested pulling directions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Cable manufacturers shall be BICC, Okonite, Pirelli or equal.

B. Cable terminations and splices shall be manufactured by 3M, Elastimold, or equal.

C. Fire-proofing and arc-proofing tape shall be manufactured by Bishop (Model 43A), 3M (Model 7700), or equal.

D. Provide the services of a qualified testing laboratory to perform the specified field tests. Notify the Owner's Representative 7 days in advance of performance of work requiring testing. Refer to Section 26 05 00 regarding additional requirements.

2.2 MATERIALS

A. 15kV, ungrounded, shielded, single copper conductor, UL listed Type MV, with ethylene-propylene (EPR) insulation, jacketed. Manufactured within one year of installation.

B. Suitable for installation in conduit, subject to alternately wet and dry conditions.

C. To operate satisfactorily, both electrically and mechanically, at conductor temperatures not exceeding 90 degrees C continuous for normal loading; 130 degrees C for emergency loading, emergency of 36 hours; 250 degrees C for short circuit loading assuming a short circuit duration of two seconds. Emergency overload operation may occur for periods up to 100 hours per year

and with as many as five (5) such 100-hour periods within the lifetime of the cable.

D. Cable to meet the specifications and the minimum requirements of the latest revisions of ICEA and AEIC Standards.

E. Soft, annealed copper, concentric Class B stranded per ASTM B-8.

F. Thermoset EPR based material or a material extruded over the conductors with thermal characteristics equal to or better than those of the insulation; chemically compatible with the conductor and the cable insulation; firmly and continuously bonded to the overlaying insulation; easily removable from the conductors; not less than 25 mils or more than 50 mils thick. Compatibility of material shall be demonstrated by laboratory test results.

G. High quality, ethylene-propylene base, thermosetting compound of high dielectric strength with heat, moisture, ozone, and corona resistant properties, homogenous, solid, and applied with good workmanship. Insulation thickness shall be 220 mils minimum average, and 200 mils minimum at any point; meet or exceed the latest editions of Standards ICEA S-68-516, AEIC CS-6 for 133% insulation level. EPR insulation compound shall be free from polyethylene.

H. Insulated conductor to have a suitable layer of semi-conducting, extruded, thermosetting, polyethylene insulation shielding applied directly over the insulation; 50 mils average thickness; 45 mils minimum thickness; impervious to sunlight, the elements and acid or alkaline soils.

I. Uncoated copper tape shield, helically applied over insulation 0.0005 inch thick with minimum 25% overlap. Minimum ampacity of shield to be one-third that of phase wire.

J. 80 mil, minimum average thickness polyvinyl chloride jacket extruded over the shielding tape; smooth, of uniform composition and free of holes, cracks and imperfections; longitudinal shrinkage relative to the insulation less than five percent.

K. Strand shielding insulation and semi-conducting insulation shield shall be applied in a continuous triple-tandem extrusion process.

L. Provide durable lifetime identification printed, embossed, or engraved on outer surface of the jacket including manufacturer's name, year of manufacture, place of manufacture, conductor type and size, insulation thickness in mils, and the rated voltage, all on 3 foot center maximum spacing.

M. Seal ends of cable with mastic material and tight fitting plastic end cap to prevent entrance of moisture.

2.3 CABLE TERMINATIONS

A. IEEE 48; Class 1, shrinkable rubber or polymeric cable termination in kit form with ground clamp, non-tracking skirts, moisture-blocked ground braid and auxiliary materials; rated for voltage class of cable being terminated.

2.4 CABLE SPLICES

A. 15kV splices shall consist of a 600 ampere separable insulated connection T-Bolt system rated for continuous operation at 15kV for single-conductor shielded power cables. The system components shall be designed according to the specifications listed in ANSI/IEEE Standard 386-1985 for 15kV 600A dead-break interfaces. The system shall be made up of specific kits designed for splicing, tapping (adding-on) dead-ending, and 600A equipment connecting. Each kit shall contain all the components necessary for its intended application. The connector cable

sizing adapter and shield adapter shall be contained in a separate adapter kit. The system shall be capable of making dead-end, 2-way, 3-way or multiple tap splices, and of making connections to 15kV 600A apparatus bushings.

PART 3 - EXECUTION

3.1 PREPARATION

A. Use swab to clean conduits and ducts before pulling cables.

3.2 INSTALLATION

A. Install cable and accessories in accordance with manufacturer's instructions.

B. Avoid abrasion and other damage to cables during installation.

C. Use listed cable pulling lubricants and pulling equipment.

D. Do not exceed any value generated by the pull-tension study. Provide a recording dynamometer with break-away fitting at each pulling station. Record the cable pulling tensions during installation and provide the recording to the Engineer.

E. Ground cable shield at each termination and splice. Conductor shield continuity must be maintained at all splices.

F. Install cables in manholes such that cables loop around the complete the interior of the manholes and have sufficient slack for addition of minimum one set of T-bolt splices. Attach all cables to vertical cable racks installed in all manholes. Coordinate exact attachment requirements with Owner prior to rough-in.

G. Arrange cable in manholes to avoid interference with duct entrances and future splicing.

H. Fireproof cables in manholes using fireproofing tape in half-lapped wrapping. Extend fireproofing one inch into duct.

I. Spiral wrap fireproofing tape with glass tape 3M number 27 or equal.

J. Keep splices to a minimum. Pull cable in directions indicated by the pull-tension study from central manhole wherever possible.

K. All cables shall be tagged with laminated Micrata type nameplates engraved with 5/32-inch high white letters on black background, showing the size of the cable, what the cable feeds and the date it was first energized. The tags shall be attached to the cables with heavy duty nylon ties and shall be located in every pullbox, junction box, etc., and at every splice and termination. The cables shall also be phase marked "A", "B", and "C".

L. The cables shall be terminated, and spliced as shown on drawings with self-vulcanizing tapes in accordance with the printed instructions of the manufacturer of the cable supplied. All self-vulcanizing tapes used to provide the cable insulation shall have an EPR base. All cable splices shall be 15kV, 133% rated. Cable splices shall be constructed per IEEE #404 1986 standard.

M. Single conductor cables in gutters or wireways, or racks in vaults, shall have the three conductors or each circuit bound together with plastic cable ties at points not over three feet

apart.

N. Stress cones shall be made on all cable splices and terminations, and shall be made in accordance with the printed recommendations of the cable manufacturer.

O. The conductor shields shall be grounded at each termination of the cable run, and on both sides of all splices, using a stranded, #6 bare copper wire to the nearest grounding electrode system. Conductor shield continuity must be maintained at all splices. The ground wire shall be protected from mechanical injury by enclosing it in a metal protective covering or by placing it where it will not be subject to damage.

P. Provide one #4/0 bare copper ground conductor in each conduit with phase conductors.

PART 4 - TESTING

4.1 FIELD TESTS

A. Perform DC high potential test of each conductor in accordance with NEMA WC 74.

B. Connect untested conductors in circuit to ground during test.

C. Apply test voltage in at least eight equal increments to maximum test voltage.

D. Record leakage current at each increment, allowing for charging current decay.

E. Hold maximum test voltage for fifteen minutes. Record current at 30 seconds and every 60 seconds thereafter. Plot results on X-Y axis.

F. Each insulated conductor provided under this section of the specification shall be tested in accordance with Section E of AEIC CS6.

4.2 PROTECTION

A. Protect installed cables from entrance of moisture. Provide heat shrink caps per Cable Manufacturer’s recommendations for cables to be energized at a later date.

END OF SECTION 26 05 13

SECTION 26 05 19 - WIRE AND CABLE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general conditions, Division 1, and Basic Electrical Requirements (Section 26 05 00) are part of this section and the contract for this work and apply to this section as fully as if repeated herein.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 QUALITY ASSURANCE AND STANDARDS

A. All work, material or equipment shall comply with the codes, ordinances and regulations of the local government having jurisdiction, including the regulations of serving utilities and any participating government agencies having jurisdiction.

B. All electrical work shall comply with the latest edition under enforcement including all amendments, modifications, and supplements of the following codes and standards or other regulations which may apply:

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2. American National Standards Institute (ANSI)
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4. Institute of Cable Engineers Association (ICEA)
5. Institute of Electrical and Electronic Engineers (IEEE)
6. Local Code Enforcement Agency Requirements
7. National Electrical Code (NEC)
8. National Electrical Contractor's Association (NECA)
9. National Electrical Manufacturer's Association (NEMA)
10. National Electrical Testing Association (NETA)
11. National Fire Protection Association (NFPA)
12. Underwriter's Laboratories, Inc.(UL)
13. International Building Code (IBC)

No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. Any conflicts or changes required to the contract documents in order to obtain compliance with applicable codes shall be brought to the immediate attention of the Engineer, Architect, and Owner's Representative by the contractor.

C. All items shall be listed by Underwriter's Laboratories and shall bear the UL label.

D. Equipment shown to scale is approximate only and based upon a general class of equipment specified. The Contractor shall verify all dimensions and clearances prior to commencement of work.

E. The Contractor shall verify all points of connection with the manufacturer's requirements, instructions, or recommendations prior to installation. The actual dimensions, weights,

clearance requirements and installation requirements shall be verified and coordinated by the contractor.

1.3 SUBMITTALS

A. Submit shop drawings per Section 26 05 00 for review including the following:

1. Conductor materials and stranding.
2. Connector and termination materials.
3. Installation materials and methods.
4. Termination materials and methods.

PART 2 - PRODUCTS

2.1 Conductors shall be copper; conductors size #12AWG and smaller shall be solid, conductors size #10AWG and larger shall be stranded. Conductors shall be minimum size #12AWG for power and lighting circuits; control circuits shall use a minimum conductor size of #14AWG.

2.2 Insulation shall be type THW or THHN/THWN for all branch circuits up to and including size #2AWG. Insulation for conductors over size #2AWG shall be XHHW.

2.3 Jackets shall be nylon or PVC material.

2.4 All cables shall be UL listed for the application.

2.5 All conductors shall be installed in conduit in the field, unless specifically noted otherwise in these documents. Type AC and type NM cable is not acceptable; type MC cable may be used where specifically noted for purposes of flexibility, maintenance, or ease of installation but shall not be used without explicit permission and direction of the Engineer.

2.6 Multi-conductor flexible cords shall be types SO, SJO, STO, or SJTO.

2.7 Electrical connectors shall be UL listed and suitable for the conductor material being connected and rated appropriately. Connectors shall be solderless helical metal spring pressure type for conductors #10AWG and smaller. Connectors shall be compression type for conductors #8AWG and larger.

PART 3 - EXECUTION

3.1 One grounded (neutral) conductor must be installed for each circuit provided. Sharing of neutrals between multiple ungrounded branch circuits is not allowed.

3.2 All wiring methods shall comply with the latest enforced edition of the National Electrical Code and the authority having jurisdiction.

3.3 Conductors shall be installed in clean raceways using nylon cord, polypropylene cord, hemp rope, or other material which will not damage the conductors or conduit. Do not use metal fish tape to pull conductors. Use a listed cable pulling lubricant when necessary for pulling.

3.4 Conductors shall be pulled into conduit simultaneously so as to not damage conductors during

pulling.

3.5 Conductors installed at outlets and switches shall have a minimum of 6" pigtail left in the box for future connections. All conductors not connected to devices shall be terminated with splice caps and tape.

3.6 Conductors shall be terminated such that no copper material is exposed. Conductors shall be trained and labeled at terminations in a neat and workmanlike manner.

3.7 All terminations shall be mechanically sound, featuring helical twisting of the terminating conductors prior to the application of an electrical connector. The electrical connector shall not be used for the mechanical connection of the conductors.

3.8 All terminations shall comply with the manufacturer's installation and torquing requirements.

3.9 Splices on conductors #10AWG and smaller shall be made with splice caps twisted onto the conductors. Tape all splices.

3.10 Splices on conductors #8AWG and larger shall be made with pressure connectors and terminal lugs. Where exposed to water, damp air, or moisture splices shall be watertight.

3.11 Splices shall be not be made in feeders; splices to branch circuits shall not be made within panelboards or similar enclosures.

3.12 When combining homeruns, the Contractor shall derate all conductors per NEC requirements including reducing the conductor ampacity and using high temperature insulation where necessary. Conduit sizes shall be adjusted by the Contractor, per NEC requirements, for any conductor revisions.

3.13 The Contractor shall provide a code-sized insulated grounding conductor, in addition to the feeder conductors indicated on the drawings, for all feeder circuits.

3.14 Conductors shall be color-coded as follows:

208Y/120V	Phase	480Y/277V
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray
Green	Ground	Green

3.15 Where tape or labels are used for color-coding, apply material at each end of the conductor, at all splices, within all boxes, and at all terminations. Where color other than black is not an integral part of insulation use 3M No. 35 tapes in the same color code to identify both ends of conductors No. 6 and larger. Use other colors as required to identify control or other special circuits. Ground conductor will have green insulation for 1/0 or smaller conductors, green tapes on other colors of insulation are NOT acceptable. All neutral wires shall be white with phase stripe running along entire length.

END OF SECTION 26 05 19

SECTION 26 05 26 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general conditions, Division 1, and Basic Electrical Requirements (Section 26 05 00) are part of this section and the contract for this work and apply to this section as fully as if repeated herein.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 SCOPE

A. Permanently and effectively ground conduit systems, supports, cabinets, switchboards, equipment cases, motor frames, lighting standards, landscape lighting, etc., and system neutral conductors per National Electrical Code.

B. Grounding details, symbols and singlelines shown on plans are schematic only. If additional equipment, such as ground rods, clamps, conductors, etc., is required per National Electrical Code furnish and install without additional cost to Owner.

1.3 QUALITY ASSURANCE AND STANDARDS

A. The latest revision of standards listed below form an integral part of this specification.

1. American Disabilities Act (ADA)
2. American National Standards Institute (ANSI)
3. American Society for Testing and Materials (ASTM)
4. Institute of Cable Engineers Association (ICEA)
5. Institute of Electrical and Electronic Engineers (IEEE)
6. Local Code Enforcement Agency Requirements
7. National Electrical Code (NEC)
8. National Electrical Contractor's Association (NECA)
9. National Electrical Manufacturer's Association (NEMA)
10. National Electrical Testing Association (NETA)
11. National Fire Protection Association (NFPA)
12. Underwriters' Laboratories, Inc. (UL)
13. International Building Code (IBC)

B. Furnish products listed by Underwriters Laboratories, Inc. as suitable for purposes specified and shown.

1.4 SUBMITTALS

A. Submit shop drawings per Section 26 05 00 for review.

B. Manufacturer’s data on grounding and bonding products and associated accessories.

1.5 ACCEPTABLE MANUFACTURERS

A. Burndy Corporation

B. Cadweld Division

C. Crouse-Hinds

D. Thomas and Betts Corporation

E. Okonite Company

F. Tecto Weld

PART 2 - PRODUCTS

2.1 GROUNDING MATERIAL

A. Rod Electrode: Material to be copper clad steel rod, 3/4 inch diameter with minimum 10 feet length.

B. Mechanical Connectors: Material shall be copper and of sound continuity when installed.

C. Exothermic Connectors: Material shall be of low emission, electric-start type and of sound continuity when installed.

D. Bare Ground Conductors

1. Conductor shall be 7-strand annealed copper.
2. Individual members of stranded conductor shall meet the requirements of ASTM B-3.
3. Stranded conductors shall be assembled in accordance with the requirements of ASTM B-8.

E. Insulated Conductor (Equipment grounding conductor)

1. Size in accordance with NEC Article 250-95 unless otherwise shown as oversize.

F. Grounding Well Components

1. Well Pipe: Material shall be 8 inch diameter by 24 inch long concrete pipe with belled end.
2. Well Cover: Material shall be cast iron with the text "GROUND" embossed on cover.

G. Ground Bus Bar

1. ASTM B187, 98% conductivity copper bus bar, size 4 inches wide by 1/4inch thick by 24 inches long.

H. Terminal Lugs

1. For 4/0 AWG and smaller conductors: Copper compression lugs.
2. For 250kcmil and larger: Aluminum mechanical lugs.

I. Bonding Plates, Connectors, Terminals and Clamps

1. Bonding Plates, Connectors, Terminals and Clamps: Provide electrical bonding plates, connectors, terminals, lugs and clamps as recommended by bonding plate, connector, terminal and clamp manufacturers for indicated applications.

J. Jumpers

1. Copper braided or leaf-type flexible jumper, size as necessary.

K. Bus Bar Insulators

1. Fiberglass reinforced polyester insulator with 2 inch diameter threaded holes at both ends for bus bar installation.

L. Electrical Grounding Connection Accessories

1. Electrical Grounding Connection Accessories: Provide electrical insulating tape, heat-shrinkable insulating tubing, welding materials, bonding straps, as recommended by accessories manufacturers for type service indicated.

M. Field Welding

1. Field Welding: Comply with AWS Code for procedures, appearance, and quality of welds; and for methods used in correction welding work. Provide welded connections where grounding conductors connect to underground grounding and plate electrodes.

N. Grounding Resistors

1. Provide a low-resistance grounding resistor in compliance with the latest IEEE-32 standard.
2. Temperature rise shall not exceed 760 degrees C above an ambient temperature of 30 degrees C for a ten-second duration.
3. Neutral grounding relays shall be set to protect the resistor and clear the fault within ten-seconds.
4. For resistors above 600V, an applied high potential test shall be performed equal to 2.25 times the rated voltage, plus 2000 volts.
5. Grounding resistors shall be UL or CSA listed and labeled.

PART 3 - EXECUTION

3.1 GENERAL

A. Install electrical grounding and bonding systems as indicated, in accordance with manufacturer's instructions and applicable portions of NEC, NECA's Standard of Installation, and in accordance with recognized industry practices to ensure that products comply with requirements.

B. Coordinate with other electrical work as necessary to interface installation of electrical grounding and bonding system work with other work.

C. Ground each separately-derived system neutral to nearest cold water piping, service entrance equipment grounding electrodes, and electrically continuous building steel.

D. Connect together system neutral, service equipment enclosures, electrically continuous building steel, exposed non-current carrying metal parts of electrical equipment, metal raceway systems,

grounding conductor in raceways and cables, receptacle ground connectors, and plumbing systems.

E. Apply corrosion-resistant finish to field-connections, buried metallic grounding and bonding products, and places where factory applied protective coatings have been destroyed, which are subjected to corrosive action.

3.2 GROUND INSTALLATION

A. Equipment Grounding Conductor

1. Provide separate, insulated conductor within each feeder and branch circuit raceway including lighting circuits.
2. Terminate each end on suitable lug, bus, bushing, or device.

B. Motors or equipment rated at 480V shall have bonded ground jumpers from feeder conduit to motor frame.

C. Grounding bushing shall be used wherever conduits are grounded.

D. Ground the electrical service system neutral at service entrance equipment to the grounding electrode system.

E. Install rod electrodes at locations indicated.

F. Provide grounding well pipe with cover at rod locations where indicated. Install well pipe top flush with finished grade.

G. Install products in accordance with manufacturers' instructions.

H. Use mechanical connections in above ground and accessible locations and use exothermic connectors in underground and inaccessible locations.

I. Provide bonding to meet Regulatory Requirements. Include bonding of metallic gas and sprinkler piping systems.

J. Install ground clamps specifically designed for grounding purposes. Where grounded conductor is in conduit, use ground clamp which grounds both conductor and conduit. Strap metal is not acceptable for grounding and bonding.

K. 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.

L. 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.

3.3 ISOLATED GROUND INSTALLATION

A. Provide isolated grounding conductor for circuits supplying isolated ground receptacles. Ground conductor will be sized per NEC unless otherwise noted to be of larger size.

B. Isolated ground conductor shall be routed through panel and to transformer ground for 208V or 120V systems. Isolated ground shall be routed to distributed rod electrode for 480V or 277V systems.

3.4 GROUND RESISTANCE TESTING

A. Grounding electrode resistance testing shall be accomplished with a ground resistance direct reading single test meter utilizing the fall-of-potential method and two reference electrodes. Perform test prior to interconnection to other grounding systems. Orient the concrete-encased ground electrode to be tested and the two reference electrodes in a straight line spaced fifty (50) feet apart. Drive the two reference electrodes five (5) feet apart.

B. Maximum grounding system resistance to be 5 ohms for secondary systems. Install additional ground rods as needed to achieve a resistance of 5 ohms.

C. Test results shall be provided in writing and shall show temperature, humidity and condition of the soil at the time of the tests.

END OF SECTION 26 05 26

SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general conditions, Division 1, and Basic Electrical Requirements (Section 26 05 00) are part of this section and the contract for this work and apply to this section as fully as if repeated herein.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 QUALITY ASSURANCE AND STANDARDS

A. All work, material or equipment shall comply with the codes, ordinances and regulations of the local government having jurisdiction, including the regulations of serving utilities and any participating government agencies having jurisdiction.

B. All electrical work shall comply with the latest edition under enforcement, including all amendments, modifications, and supplements of the following codes and standards or other regulations which may apply:

1. American Disabilities Act (ADA)
2. American National Standards Institute (ANSI)
3. American Society for Testing and Materials (ASTM)
4. Institute of Cable Engineers Association (ICEA)
5. Institute of Electrical and Electronic Engineers (IEEE)
6. Local Code Enforcement Agency Requirements
7. National Electrical Code (NEC)
8. National Electrical Contractor’s Association (NECA)
9. National Electrical Manufacturer’s Association (NEMA)
10. National Electrical Testing Association (NETA)
11. National Fire Protection Association (NFPA)
12. Underwriter’s Laboratories, Inc. (UL)
13. International Building Code (IBC)

No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. Any conflicts or changes required to the contract documents in order to obtain compliance with applicable codes shall be brought to the immediate attention of the Engineer, Architect, and Owner’s Representative by the contractor.

C. All items shall be listed by Underwriter’s Laboratories and shall bear the U.L. label.

D. Equipment shown to scale is approximate only and based upon a general class of equipment specified. The Contractor shall verify all dimensions and clearances prior to commencement of work.

E. The Contractor shall verify all points of connection with the manufacturer’s requirements, instructions, or recommendations prior to installation. The actual dimensions, weights, clearance requirements and installation requirements shall be verified and coordinated by the contractor.

1.3 SUBMITTALS

A. Submit shop drawings per Section 26 05 00 for review including the following:

1. Support materials
2. Attachment and anchor materials
3. Installation materials and methods

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. 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:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Cooper B-Line, Inc.; a division of Cooper Industries.
b. Thomas & Betts Corporation.
c. Unistrut; Tyco International, Ltd.

3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
4. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
5. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
6. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following and shall be compatible with all building surfaces and materials:

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.

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) Hilti Inc.
2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.

2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

   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) Hilti Inc.
      2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

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 GRC as required by the NEC. Minimum rod size shall be 3/8 inch in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

END OF SECTION 26 05 29

SECTION 26 05 33 - RACEWAYS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general conditions, Division 1, and Basic Electrical Requirements (Section 26 05 00) are part of this section and the contract for this work and apply to this section as fully as if repeated herein.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 QUALITY ASSURANCE AND STANDARDS

A. All work, material or equipment shall comply with the codes, ordinances and regulations of the local government having jurisdiction, including the regulations of serving utilities and any participating government agencies having jurisdiction.

B. All electrical work shall comply with the latest edition under enforcement, including all amendments, modifications, and supplements of the following codes and standards or other regulations which may apply:

1. American Disabilities Act (ADA)
2. American National Standards Institute (ANSI)
3. American Society for Testing and Materials (ASTM)
4. Institute of Cable Engineers Association (ICEA)
5. Institute of Electrical and Electronic Engineers (IEEE)
6. Local Code Enforcement Agency Requirements
7. National Electrical Code (NEC)
8. National Electrical Contractor's Association (NECA)
9. National Electrical Manufacturer's Association (NEMA)
10. National Electrical Testing Association (NETA)
11. National Fire Protection Association (NFPA)
12. Underwriter's Laboratories, Inc. (UL)
13. International Building Code (IBC)

No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. Any conflicts or changes required to the contract documents in order to obtain compliance with applicable codes shall be brought to the immediate attention of the Engineer, Architect, and Owner's Representative by the contractor.

C. All items shall be listed by Underwriter's Laboratories and shall bear the U.L. label.

D. Equipment shown to scale is approximate only and based upon a general class of equipment specified. The Contractor shall verify all dimensions and clearances prior to commencement of work.

E. The Contractor shall verify all points of connection with the manufacturer's requirements, instructions, or recommendations prior to installation. The actual dimensions, weights, clearance requirements and installation requirements shall be verified and coordinated by the

contractor.

1.3 SUBMITTALS

A. Submit shop drawings per Section 26 05 00 for review including the following:

1. Raceway materials
2. Fitting materials
3. Installation materials and methods

PART 2 - PRODUCTS

2.1 RIGID GALVANIZED STEEL (RGS) CONDUIT

A. Continuous hot-dipped galvanized manufactured per UL and ANSI requirement.

B. Rigid aluminum conduit is not acceptable.

C. Conduit bodies for use with steel conduit, rigid or flexible, shall be manufactured per UL requirements and shall be cast metal with gasketed closures.

D. Fittings for RGS conduit shall be malleable iron or forged steel with cadmium or zinc coating.

E. Union couplings for joining rigid conduit at intermediate runs shall be of the same material as the conduit. Couplings shall be threaded concrete-tight to permit completing conduit runs when neither conduit can be turned and to permit breaking the conduit run at the union.

F. Set screw connectors or threadless type are not acceptable.

G. Minimum raceway size shall not be less than ¾".

2.2 ELECTRICAL METALLIC TUBING (EMT)

A. Conduit shall be cold rolled zinc coated steel and manufactured per UL and ANSI requirements.

B. Fittings for EMT shall be watertight steel or malleable gripping ring compression type.

C. Pressure cast material for nuts of compression ring type fittings and set-screw connections are not acceptable.

D. Minimum raceway size shall be ¾".

2.3 ELECTRICAL NON-METALLIC TUBING (ENT)

A. Conduit shall be manufactured in accordance with NEMA TC13 standards and shall be UL listed.

B. Fittings for ENT shall be snap-on type threaded male adapters and locknuts.

C. Minimum raceway size shall be ¾".

2.4 FLEXIBLE METALLIC CONDUIT

A. Flexible conduit shall bear the UL label and be zinc coated steel.

B. Fittings for flexible metallic conduit shall be steel or malleable iron. Fittings shall clamp to conduit securely.

C. Screw in type, sheet metal or set-screw type fittings are not acceptable.

D. Minimum raceway size shall not be less than ¾".

2.5 LIQUID TIGHT FLEXIBLE CONDUIT

A. Conduit shall be manufactured in accordance with UL and ANSI requirements. Conduit shall be approved for grounding and compatible with approved fittings. Flexible steel conduit shall be hot dipped galvanized with extruded PVC covering manufactured per UL requirements.

B. Fittings shall be liquid tight type with body and gland nut of steel or malleable iron with provisions for grounding flexible conduit to fittings.

C. Minimum raceway size shall be ¾".

2.6 POLYVINYL CHLORIDE (PVC) CONDUIT

A. PVC shall be constructed of a virgin homopolymer PVC compound and be manufactured according to NEMA and UL specifications. PVC conduit shall be Schedule 40 or 80.

B. Minimum raceway size shall be ¾".

PART 3 - EXECUTION

3.1 RIGID GALVANIZED STEEL (RGS) CONDUIT

A. All conduit exposed on salt air to be PVC coated.

B. All conduits exposed below 4 feet of finish grade on walls shall be rigid conduit.

C. RGS shall be used where exposed to weather or where subject to physical damage in exposed areas below 8'0" above finished floor.

D. RGS shall be used in NEC classified hazardous locations with seal connections per NEC requirements.

3.2 ELECTRICAL METALLIC TUBING (EMT)

A. All wiring inside the building will be in E.M.T. conduit.

B. All E.M.T. connector, coupling, and other fittings will be non- cast steel compression type.

C. EMT shall be run indoors concealed in drywall type construction, above suspended ceilings, and exposed indoors not less than 8'0" above finished floor in unfinished areas.

D. EMT shall not be installed underground, outdoors, or embedded in concrete.

3.3 ELECTRICAL NON-METALLIC TUBING (ENT)

A. ENT shall be run indoors concealed in drywall type construction where permissible by Code and by the local authority. ENT shall not be installed in any exposed areas.

B. ENT to be installed embedded in concrete shall be approved by the Structural Engineer prior to installation. All embedded installations shall comply with the installation requirements provided by the Structural Engineer.

3.4 FLEXIBLE METALLIC CONDUIT

A. Flexible conduit shall be used for indoor lighting connections in suspended ceiling areas and on motor connections. Flexible conduit shall not exceed 6'0" in length.

B. Flexible conduit shall be used for final connection to control equipment and not to exceed 2'0" in length.

C. The conduit grounding system shall be continuous as recommended by the manufacturer and UL approved.

3.5 LIQUID TIGHT FLEXIBLE CONDUIT

A. Liquid tight flexible conduit shall be used for final connection to machines, motors, transformers and equipment that requires vibration isolation.

B. Liquid tight flexible conduit shall be used for final connection to equipment in wet or damp locations or where exposed to grease, water, dust, dirt, vapors, or chemicals.

C. The conduit grounding system shall be continuous as recommended by the manufacturer and UL requirements.

3.6 POLYVINYL CHLORIDE (PVC) CONDUIT

A. All conduits in the ground will be P.V.C. schedule #40, (minimum) 3/4 inch or larger in diameter.

B. All P.V.C. will be buried below ground level and NEVER be in a concrete slab or concrete floor.

C. All sweeps, bends, and risers shall be concrete encased Schedule 80.

D. All stub-ups in P.V.C. will be changed to E.M.T. in walls. Exceptions are outside block walls can be P.V.C. No flexible conduit will be used.

E. All underground high voltage conduit, telephone conduit, service entrance conduit and feeders 100A and over shall have 3" of red mixed concrete cover and a metallic locating tape installed 6” above the top of the conduit.

F. All PVC conduit feeders shall contain a copper green grounding conductor sized per NEC requirements and continuity shall be maintained throughout conduit runs and pullboxes.

3.7 CONDUIT INSTALLATION

A. All conduit installation methods shall comply with the latest enforced edition of the National Electrical Code and the authority having jurisdiction.

B. All conduit installations shall comply with the manufacturer's installation requirements.

C. All spare conduit shall be cleaned, mandrelled, and provided with a pullwire.

D. Conduit run above suspended ceilings will be supported from the building structure independently and will be run with sufficient clearance from the ceiling system to permit the tiles to be removed and to allow full access to the space above.

E. Roof top conduits will be installed in rigid steel will be neatly grouped and installed parallel to the building lines. Support for conduit shall be rubber sleepers with unistrut on top.

F. Home runs will be a minimum of 3/4" conduit. 1/2" can be used to supply a single termination (e.g., conduit going from switch box to single light fixture).

END OF SECTION 26 05 33

SECTION 26 05 34 - BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general conditions, Division 1, and Basic Electrical Requirements (Section 26 05 00) are part of this section and the contract for this work and apply to this section as fully as if repeated herein.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 QUALITY ASSURANCE AND STANDARDS

A. All work, material or equipment shall comply with the codes, ordinances and regulations of the local government having jurisdiction, including the regulations of serving utilities and any participating government agencies having jurisdiction.

B. All electrical work shall comply with the latest edition under enforcement including all amendments, modifications, and supplements of the following codes and standards or other regulations which may apply:

1. American Disabilities Act (ADA)
2. American National Standards Institute (ANSI)
3. American Society for Testing and Materials (ASTM)
4. Institute of Cable Engineers Association (ICEA)
5. Institute of Electrical and Electronic Engineers (IEEE)
6. Local Code Enforcement Agency Requirements
7. National Electrical Code (NEC)
8. National Electrical Contractor's Association (NECA)
9. National Electrical Manufacturer's Association (NEMA)
10. National Electrical Testing Association (NETA)
11. National Fire Protection Association (NFPA)
12. Underwriters' Laboratories, Inc. (UL)
13. International Building Code (IBC)

No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. Any conflicts or changes required to the contract documents in order to obtain compliance with applicable codes shall be brought to the immediate attention of the Engineer, Architect, and Owner’s Representative by the contractor.

C. All items shall be listed by Underwriter’s Laboratories and shall bear the U.L. label.

D. Equipment shown to scale is approximate only and based upon a general class of equipment specified. The Contractor shall verify all dimensions and clearances prior to commencement of work.

E. The Contractor shall verify all points of connection with the manufacturer’s requirements, instructions, or recommendations prior to installation. The actual dimensions, weights, clearance requirements and installation requirements shall be verified and coordinated by the

contractor.

1.3 SUBMITTALS

A. Submit shop drawings per Section 26 05 00 for review including the following:

1. Box materials
2. Accessory materials

PART 2 - PRODUCTS

2.1 Boxes shall be flat rolled steel sized as required by code and as suitable for the application. Boxes shall have mounting holes and knock-outs in sides and back. Grounding shall be accommodated by means of threaded holes.

2.2 Provide accessories, extension rings, gaskets, supports, trim rings, hangers, straps, and other material as necessary for a complete code complying installation.

2.3 Boxes installed outdoors shall be weathertight, dusttight, and corrosion resistant. Provide gaskets and conduit hubs.

2.4 Provide type FS boxes for surface mounted applications.

2.5 Any exposed wiring device box will be cast iron only. No cast aluminum.

2.6 Any exposed light fixture junction boxes will be cast iron only. No cast aluminum.

2.7 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.

2.8 Inside wiring device boxes and junction boxes will be at least 4" square by 2 1/8 inch deep.

2.9 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.

2.10 Provide additional support for boxes as necessary when mounting fixtures or devices from boxes.

2.11 Provide ganged boxes for multiple switches and devices; provide barriers for boxes served by separate voltages.

2.12 Acceptable manufacturers shall be Appleton, Crouse Hinds, Steel City, or Raco.

PART 3 - EXECUTION

3.1 All box installation methods shall comply with the latest enforced edition of the National Electrical Code and the authority having jurisdiction.

3.2 Install all boxes plumb, square, and securely fastened to structure.

3.3 Boxes shall be placed such that they are readily accessible.

3.4 Cover or plug all unused openings in boxes where knockout blanks have been removed.

3.5 Install boxes such that they are flush with the finished surface of the wall or surface within which they are mounted.

3.6 Install all boxes at mounting heights per architectural plans, NEC requirements, and ADA requirements.

3.7 Boxes shall not be mounted back to back in walls. Minimum offset shall be 12".

3.8 Boxes in sealed environments shall be sealed with an approved sealant suitable for the application.

3.9 Boxes penetrating fire rated walls or surfaces shall be sealed with a Fire Marshal approved fire sealant to maintain the fire rating of the wall or surface.

3.10 Boxes located above inaccessible ceilings shall be made accessible by means of access doors or hatches in the ceiling.

3.11 Install all boxes per manufacturer's recommendations and requirements.

3.12 Provide for ground continuity at all boxes.

END OF SECTION 26 05 34

SECTION 26 05 36 - CABLE TRAYS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general conditions, Division 1, and Basic Electrical Requirements (Section 26 05 00) are part of this section and the contract for this work and apply to this section as fully as if repeated herein.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 QUALITY ASSURANCE AND STANDARDS

A. All work, material or equipment shall comply with the codes, ordinances and regulations of the local government having jurisdiction, including the regulations of serving utilities and any participating government agencies having jurisdiction.

B. All electrical work shall comply with the latest edition under enforcement, including all amendments, modifications, and supplements of the following codes and standards or other regulations which may apply:

1. American Disabilities Act (ADA)
2. American National Standards Institute (ANSI)
3. American Society for Testing and Materials (ASTM)
4. Institute of Cable Engineers Association (ICEA)
5. Institute of Electrical and Electronic Engineers (IEEE)
6. Local Code Enforcement Agency Requirements
7. National Electrical Code (NEC)
8. National Electrical Contractor's Association (NECA)
9. National Electrical Manufacturer's Association (NEMA)
10. National Electrical Testing Association (NETA)
11. National Fire Protection Association (NFPA)
12. Underwriter's Laboratories, Inc. (UL)
13. International Building Code (IBC)

No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. Any conflicts or changes required to the contract documents in order to obtain compliance with applicable codes shall be brought to the immediate attention of the Engineer, Architect, and Owner's Representative by the contractor.

C. All items shall be listed by Underwriter's Laboratories and shall bear the U.L. label.

D. Equipment shown to scale is approximate only and based upon a general class of equipment specified. The Contractor shall verify all dimensions and clearances prior to commencement of work.

E. The Contractor shall verify all points of connection with the manufacturer's requirements, instructions, or recommendations prior to installation. The actual dimensions, weights, clearance requirements and installation requirements shall be verified and coordinated by the contractor.

1.3 SUBMITTALS

A. Submit shop drawings per Section 26 05 00 for review including the following:

1. Cable tray materials
2. Fitting and bonding materials
3. Installation materials and methods

1.4 DELIVERY, STORAGE, AND HANDLING

A. Aluminum cable tray may be stored outside with cover, shall be loosely stacked, shall be elevated off the ground, and ventilated to prevent staining during storage.

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. Cooper B-Line, Inc.
2. PW Industries.

2.2 MATERIALS AND FINISHES

A. Cable Trays, Fittings, and Accessories: Aluminum, complying with NEMA VE 1, Aluminum Association's Alloy 6063-T6 for rails, rungs, and cable trays, and Alloy 5052-H32 or Alloy 6061-T6 for fabricated parts; with Type 316 stainless-steel splice-plate fasteners, bolts, and screws

B. Cable Trays, Fittings, and Accessories: Stainless steel, Type 316, complying with NEMA VE 1.

C. Sizes and Configurations: Refer to the Drawings for specific requirements for types, materials, sizes, and configurations.

1. Center-hanger supports may be used only when specifically indicated.

2.3 CABLE TRAY ACCESSORIES

A. Fittings: Tees, crosses, risers, elbows, and other fittings as indicated, of same materials and finishes as cable tray.

B. Barrier Strips: Same materials and finishes as cable tray.

C. Cable tray supports and connectors, including bonding jumpers, as recommended by cable tray manufacturer.

2.4 SOURCE QUALITY CONTROL

A. Perform design and production tests according to NEMA VE 1.

PART 3 - EXECUTION

3.1 CABLE TRAY INSTALLATION

A. Comply with recommendations in NEMA VE 2. Install as a complete system, including all necessary fasteners, hold-down clips, splice-plate support systems, barrier strips, hinged horizontal and vertical splice plates, elbows, reducers, tees, and crosses.

B. Remove burrs and sharp edges from cable trays.

C. Fasten cable tray supports to building structure and install seismic restraints.

1. Design each fastener and support to carry load indicated by Seismic Design Category D requirements.
2. Place supports so that spans do not exceed maximum dictated by the NEC.
3. Construct supports from channel members, threaded rods, and other appurtenances furnished by cable tray manufacturer. Arrange supports in trapeze or wall-bracket form as required by application.
4. Manufacture center-hung support, designed for 60 percent versus 40 percent eccentric loading condition, with a safety factor of 3.
5. Locate and install supports according to NEMA VE 1.

D. Make connections to equipment with flanged fittings fastened to cable tray and to equipment. Support cable tray independent of fittings. Do not carry weight of cable tray on equipment enclosure.

E. Install expansion connectors where cable tray crosses building expansion joints or seismic joints. Space connectors and set gaps according to applicable standard.

F. Make changes in direction and elevation using standard fittings.

G. Make cable tray connections using standard fittings.

H. Seal penetrations through fire and smoke barriers according to Division 7 Section "Through-Penetration Firestop Systems."

I. Workspace: Install cable trays with enough space to permit access for installing cables.

3.2 CONNECTIONS

A. Ground cable trays according to manufacturer's written instructions.

B. Install an insulated equipment grounding conductor with cable tray, in addition to those required by NFPA 70.

3.3 FIELD QUALITY CONTROL

A. After installing cable trays and after electrical circuitry has been energized, survey for compliance with requirements. Perform the following field quality-control survey:

1. Remove deposits of dust, industrial process materials, trash of any description, and any blockage of tray ventilation.
2. Visually inspect each cable tray joint and each ground connection for mechanical continuity. Check bolted connections between sections for corrosion. Clean and retorque in suspect areas.
3. Check for missing or damaged bolts, bolt heads, or nuts. When found, replace with specified hardware.
4. Perform visual and mechanical checks for adequacy of cable tray grounding; verify that all takeoff raceways are bonded to cable tray.

END OF SECTION 26 05 36

SECTION 26 05 44 - PRECAST MANHOLES AND HANDHOLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general conditions, Division 1, and Basic Electrical Requirements (Section 26 05 00) are part of this section and the contract for this work and apply to this section as fully as if repeated herein.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 QUALITY ASSURANCE AND STANDARDS

A. All work, material or equipment shall comply with the codes, ordinances and regulations of the local government having jurisdiction, including the regulations of serving utilities and any participating government agencies having jurisdiction.

B. All electrical work shall comply with the latest edition under enforcement, including all amendments, modifications, and supplements of the following codes and standards or other regulations which may apply:

1. American Disabilities Act (ADA)
2. American National Standards Institute (ANSI)
3. American Society for Testing and Materials (ASTM)
4. Institute of Cable Engineers Association (ICEA)
5. Institute of Electrical and Electronic Engineers (IEEE)
6. Local Code Enforcement Agency Requirements
7. National Electrical Code (NEC)
8. National Electrical Contractor's Association (NECA)
9. National Electrical Manufacturer's Association (NEMA)
10. National Electrical Testing Association (NETA)
11. National Fire Protection Association (NFPA)
12. Underwriter's Laboratories, Inc. (UL)
13. International Building Code (IBC)

No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. Any conflicts or changes required to the contract documents in order to obtain compliance with applicable codes shall be brought to the immediate attention of the Engineer, Architect, and Owner's Representative by the contractor.

C. All items shall be listed by Underwriter's Laboratories and shall bear the U.L. label.

D. Equipment shown to scale is approximate only and based upon a general class of equipment specified. The Contractor shall verify all dimensions and clearances prior to commencement of work.

E. The Contractor shall verify all points of connection with the manufacturer's requirements, instructions, or recommendations prior to installation. The actual dimensions, weights, clearance requirements and installation requirements shall be verified and coordinated by the contractor.

1.3 SUBMITTALS

A. Submit shop drawings per Section 26 05 00 for review including the following:

1. Manhole material
2. Handhole material
3. Installation materials and methods

B. Product data: For the following:

1. Shop drawings for precast or factory-fabricated manholes and handholes: Include plans, elevations, sections, details, attachments to other work, and accessories, including the following:

a. Duct entry provisions, including locations and duct sizes.
b. Reinforcement details.
c. Frame and cover design and manhole frame support rings.
d. Ladder details.
e. Grounding details.
f. Dimensioned locations of cable rack inserts, pulling-in and lifting irons, and sumps.
g. Joint details.

2. Shop drawings for factory-fabricated manholes and handholes other than precast concrete: Include dimensioned plans, sections, and elevations, and fabrication and installation details, including the following:

a. Duct entry provisions, including locations and duct sizes.
b. Cover design.
c. Grounding details.
d. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.

3. Product Certificates: For concrete and steel used in precast concrete manholes and handholes, as required by ASTM C 858.
4. Qualification Data: For professional engineer and testing agency.
5. Source quality-control test reports.
6. Field quality-control test reports.

C. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

D. Comply with ANSI C2.

E. Comply with NFPA 70.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store precast concrete and other factory-fabricated underground utility structures at project site as recommended by manufacturer to prevent physical damage. Arrange so identification markings are visible.

B. Lift and support precast concrete units only at designated lifting or supporting points.

1.5 COORDINATION

A. Coordinate layout and installation of manholes and handholes with final arrangement of other utilities, site grading, and surface features as determined in the field.

B. Coordinate elevations of ducts and duct-bank entrances into manholes and handholes with final locations and profiles of ducts and duct banks as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations from those indicated as required to suit field conditions and to ensure that duct runs drain to manholes and handholes, and as approved by Architect.

PART 2 - PRODUCTS

2.1 PRECAST CONCRETE HANDHOLES

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. Christy Concrete Products.
2. Oldcastle Precast Group.
3. Utility Vault Co.

C. Comply with ASTM C 858 for design and manufacturing processes.

D. Description: Factory-fabricated, reinforced-concrete, monolithically poured walls and bottom unless open-bottom enclosures are indicated. Frame and cover shall form top of enclosure and shall have load rating consistent with that of handhole.

1. Frame and Cover: Weatherproof cast-iron frame, with cast-iron cover with recessed cover hook eyes and tamper-resistant, captive, cover-securing bolts.
2. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
3. Cover Legend: Molded lettering, as indicated for each service.
4. Configuration: Units shall be designed for flush burial and have Integral closed bottom, unless otherwise indicated.
5. Handholes 12 inches wide by 24 inches long and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.
6. Handholes located in vehicle areas shall feature a minimum full traffic H-20 rating.

2.2 PRECAST CONCRETE MANHOLES

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. Christy Concrete Products.
2. Oldcastle Precast Group.
3. Utility Vault Co.

C. Comply with ASTM C 858**,** with interlocking mating sections, complete with accessories, hardware, and features.

D. Manholes located in vehicle areas shall feature a minimum full traffic H-20 rating.

E. Concrete Knockout Panels: 1-1/2 to 2 inches thick, for future conduit entrance and sleeve for ground rod.

F. Joint Sealant: Asphaltic-butyl material with adhesion, cohesion, flexibility, and durability properties necessary to withstand maximum hydrostatic pressures at the installation location with the ground-water level at grade.

2.3 SOURCE QUALITY CONTROL

A. Test and inspect precast concrete utility structures according to ASTM C 1037.

PART 3 - EXECUTION

3.1 INSTALLATION OF CONCRETE MANHOLES AND HANDHOLES

A. Precast Concrete Handhole and Manhole Installation:

1. Comply with ASTM C 891, unless otherwise indicated.
2. Install units level and plumb and with orientation and depth coordinated with connecting ducts to minimize bends and deflections required for proper entrances.
3. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, and compacted to same density as adjacent undisturbed earth.

B. Elevations:

1. Manhole Roof: Install with rooftop at least 15 inches below finished grade.
2. Manhole Frame: In paved areas and trafficways, set frames flush with finished grade. Set other manhole frames 1 inch above finished grade.
3. Handhole Covers: In paved areas and trafficways, set surface flush with finished grade. Set covers of other handholes 1 inch above finished grade.

C. Drainage: Install drains in bottom of manholes where indicated. Coordinate with drainage provisions indicated on civil drawings.

D. Manhole Access: Circular opening in manhole roof; sized to match cover size.

3.2 GROUNDING

A. Ground underground ducts and utility structures according to Division 26 Section "Grounding and Bonding."

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:

1. Test manhole and handhole grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in Division 26 Section "Grounding and Bonding."

B. Correct deficiencies and retest as specified above to demonstrate compliance.

3.4 CLEANING

A. Clean internal surfaces of manholes and handholes. Remove foreign material.

END OF SECTION 26 05 44

SECTION 26 05 33 – IDENTIFICATION FOR ELECTRICAL 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. Color and legend requirements for raceways, conductors, and warning labels and signs.
2. Labels.
3. Bands and tubes.
4. Tapes and stencils.
5. Tags.
6. Signs.
7. Cable ties.
8. Paint for identification.
9. Fasteners for labels and signs.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.

B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.

C. Identification Schedule: For each piece of electrical equipment and electrical system components to be an index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.

D. Delegated-Design Submittal: For arc-flash hazard study.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with ASME A13.1 and IEEE C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Comply with NFPA 70E and Section 260574 "Overcurrent Protective Device Arc-Flash Study" requirements for arc-flash warning labels.

F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C)

2.2 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage and system or service type.

B. Color-Coding for Phase and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder and branch-circuit conductors.

1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
2. Colors for 208/120-V Circuits:

a. Phase A: Black.
b. Phase B: Red.
c. Phase C: Blue.

3. Colors for 240-V Circuits:

a. Phase A: Black.
b. Phase B: Red.

4. Colors for 480/277-V Circuits:

a. Phase A: Brown.
b. Phase B: Orange.
c. Phase C: Yellow.

5. Color for Neutral: White or gray.
6. Color for Equipment Grounds: Bare copper, Green or Green with a yellow stripe.
7. Colors for Isolated Grounds: Green with white stripe.

C. Raceways and Cables Carrying Circuits at More Than 600 V:

1. Black letters on an orange field.
2. Legend: "DANGER - CONCEALED HIGH VOLTAGE WIRING."

D. Warning Label Colors:

1. Identify system voltage with black letters on an orange background.

E. Warning labels and signs shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.3 LABELS

A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

B. Snap-around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters and that stay in place by gripping action.

C. Self-Adhesive Wraparound Labels: Preprinted, 3-mil- (0.08-mm-) thick, polyester or vinyl flexible label with acrylic pressure-sensitive adhesive.

1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
2. Marker for Labels: Permanent, waterproof, black ink marker recommended by tag manufacturer.
3. Marker for Labels: Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.

D. Self-Adhesive Labels: Polyester or Vinyl, thermal, transfer-printed, 3-mil- (0.08-mm-) thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

1. Minimum Nominal Size:

a. 1-1/2 by 6 inches (37 by 150 mm)for raceway and conductors.
b. 3-1/2 by 5 inches (76 by 127 mm)for equipment.
c. As required by authorities having jurisdiction.

2.4 BANDS AND TUBES

A. Snap-around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches (50 mm) long, with diameters sized to suit diameters and that stay in place by gripping action.

B. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at a maximum of 200 deg F (93 deg C). Comply with UL 224.

2.5 TAPES AND STENCILS

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide; compounded for outdoor use.

C. Tape and Stencil: 4-inch- (100-mm-) wide black stripes on 10-inch (250-mm) centers placed diagonally over orange background and is 12 inches (300 mm) wide. Stop stripes at legends.

D. Floor Marking Tape: 2-inch- (50-mm-) wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.

E. Underground-Line Warning Tape:

1. Tape:

a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
b. Printing on tape shall be permanent and shall not be damaged by burial operations.
c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.

2. Color and Printing:

a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE" Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE".

F. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch (25 mm).

2.6 TAGS

A. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking cable tie fastener.

B. Nonmetallic Preprinted Tags: Polyethylene tags, 0.015 inch (0.38 mm) or 0.023 inch (0.58 mm) thick, color-coded for phase and voltage level, with factory printed permanent designations; punched for use with self-locking cable tie fastener.

C. Write-on Tags:

1. Polyester Tags: 0.010 inch (0.25 mm) or 0.015 inch (0.38 mm) thick, with corrosion-resistant grommet and cable tie for attachment.
2. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
3. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.7 SIGNS

A. Baked-Enamel Signs:

1. Preprinted aluminum signs, high-intensity reflective, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal Size: 7 by 10 inches (180 by 250 mm).

B. Metal-Backed Butyrate Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch (1-mm) galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal Size: 10 by 14 inches (250 by 360 mm).

C. Laminated Acrylic or Melamine Plastic Signs:

1. Engraved legend.
2. Thickness:

    a. For signs up to 20 sq. in. (129 sq. cm), minimum 1/16 inch (1.6 mm) thick).
    b. For signs larger than 20 sq. in. (129 sq. cm), 1/8 inch (3.2 mm) thick.
    c. Engraved legend with white letters on a dark gray background.
    d. Punched or drilled for mechanical fasteners with 1/4-inch (6.4-mm) grommets in corners for mounting.
    e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.8 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 Deg F (23 Deg C) according to ASTM D 638: 12,000 psi (82.7 MPa).
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
4. Color: Black, except where used for color-coding.

B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 Deg F (23 Deg C) according to ASTM D 638: 12,000 psi (82.7 MPa).
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
4. Color: Black.

C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 Deg F (23 Deg C) according to ASTM D 638: 7000 psi (48.2 MPa).
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
5. Color: Black.

2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of each item before installing identification products.

D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

G. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.

1. Secure tight to surface of conductor, cable, or raceway.

H. System Identification for Raceways and Cables over 600 V: Identification shall completely encircle cable or conduit. Place adjacent identification of two-color markings in contact, side by side.

1. Secure tight to surface of conductor, cable, or raceway.

I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

J. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer.

K. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.

L. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:

1. "EMERGENCY POWER."
2. "POWER."
3. "UPS."

M. Vinyl Wraparound Labels:

1. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.

N. Snap-around Labels: Secure tight to surface at a location with high visibility and accessibility.

O. Self-Adhesive Wraparound Labels: Secure tight to surface at a location with high visibility and accessibility.

P. Self-Adhesive Labels:

1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.

Q. Snap-around Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.

R. Heat-Shrink, Preprinted Tubes: Secure tight to surface at a location with high visibility and accessibility.

S. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.

T. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.

1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.

U. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.

V. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.

W. Underground Line Warning Tape:

1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches (150 to 200 mm) below finished grade. Use

multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches (400 mm) overall.
2. Limit use of underground-line warning tape to direct-buried cables.
3. Install underground-line warning tape for direct-buried cables and cables in raceways.

X. Metal Tags:

1. Place in a location with high visibility and accessibility.
2. Secure using UV-stabilized cable ties.

Y. Nonmetallic Preprinted Tags:

1. Place in a location with high visibility and accessibility.
2. Secure using UV-stabilized cable ties.

Z. Write-on Tags:

1. Place in a location with high visibility and accessibility.
2. Secure using UV-stabilized cable ties.

AA. Baked-Enamel Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on minimum 1-1/2-inch- (38-mm-) high sign; where two lines of text are required, use signs minimum 2 inches (50 mm) high.

BB. Metal-Backed Butyrate Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high sign; where two lines of text are required, use labels 2 inches (50 mm) high.

CC. Laminated Acrylic or Melamine Plastic Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high sign; where two lines of text are required, use labels 2 inches (50 mm) high.

DD. Cable Ties: General purpose, for attaching tags, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

3.3 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

C. Concealed Raceways, Duct Banks, More Than 600 V, within Buildings: Tape and stencil. Stencil legend "DANGER - CONCEALED HIGH-VOLTAGE WIRING" with 3-inch- (75-mm-) high, black letters on 20-inch (500-mm) centers.

1. Locate identification at changes in direction, at penetrations of walls and floors, and at 10-foot (3-m) maximum intervals.

D. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:

1. "EMERGENCY POWER."
2. "POWER."
3. "UPS."

E. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use snap-around labels to identify the phase.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

F. Power-Circuit Conductor Identification, More Than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use write-on tags or nonmetallic preprinted tags colored and marked to indicate phase, and a separate tag with the circuit designation.

G. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use write-on tags or self-adhesive labels with the conductor or cable designation, origin, and destination.

H. Control-Circuit Conductor Termination Identification: For identification at terminations, provide heat-shrink preprinted tubes or self-adhesive labels with the conductor designation.

I. Conductors to Be Extended in the Future: Attach write-on tags or marker tape to conductors and list source.

J. Auxiliary Electrical Systems Conductor Identification: Marker tape or Self-adhesive vinyl tape that is uniform and consistent with system used by manufacturer for factory-installed connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

K. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.

L. Concealed Raceways and Duct Banks, More Than 600 V, within Buildings: Apply floor marking tape to the following finished surfaces:

1. Floor surface directly above conduits running beneath and within 12 inches (300 mm) of a floor that is in contact with earth or is framed above unexcavated space.
2. Wall surfaces directly external to raceways concealed within wall.

3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.

M. Workspace Indication: Apply floor marking tape or tape and stencil to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

N. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.

O. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Baked-enamel warning signs.

1. Apply to exterior of door, cover, or other access.
2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:

    a. Power-transfer switches.
    b. Controls with external control power connections.

P. Arc Flash Warning Labeling: Self-adhesive labels.

Q. Operating Instruction Signs: Baked-enamel warning signs.

R. Emergency Operating Instruction Signs: Baked-enamel warning signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer.

S. Coordinate "Equipment Identification Labels" Paragraph below with electrical Sections. Delete items not in Project.

T. Equipment Identification Labels:

1. Indoor Equipment: Baked-enamel signs.
2. Outdoor Equipment: Laminated acrylic or melamine sign, Stenciled legend 4 inches (100 mm) high].
3. Equipment to Be Labeled:

    a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of a engraved laminated acrylic or melamine label.
    b. Enclosures and electrical cabinets.
    c. Access doors and panels for concealed electrical items.
    d. Switchgear.
    e. Switchboards.
    f. Transformers: Label that includes tag designation indicated on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
    g. Substations.
    h. Emergency system boxes and enclosures.
    i. Motor-control centers.
    j. Enclosed switches.
    k. Enclosed circuit breakers.
    l. Enclosed controllers.
    m. Variable-speed controllers.
    n. Push-button stations.
    o. Power-transfer equipment.

p. Contactors.
q. Remote-controlled switches, dimmer modules, and control devices.
r. Battery-inverter units.
s. Battery racks.
t. Power-generating units.
u. Monitoring and control equipment.
v. UPS equipment.

END OF SECTION 26 05 33

SECTION 26 05 72 – OVERCURRENT PROTECTIVE DEVICE SHORT CIRCUIT STUDY

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 a computer-based, fault-current study to determine the minimum interrupting capacity of circuit protective devices.

1.3 DEFINITIONS

A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

B. One-Line Diagram: A diagram which shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.

C. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion from the system.

D. SCCR: Short-circuit current rating.

E. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

1.4 ACTION SUBMITTALS

A. Product Data: For computer software program to be used for studies.

B. Other Action Submittals: Submit the following after the approval of system protective devices submittals. Submittals shall be in digital form.

1. Short-circuit study input data, including completed computer program input data sheets.
2. Short-circuit study and equipment evaluation report; signed, dated, and sealed by a qualified professional engineer.

    a. Submit study report for action prior to receiving final approval of the distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that the selection of devices and associated characteristics is satisfactory.
    b. Revised single-line diagram, reflecting field investigation results and results of short-circuit study.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Short-Circuit Study Specialist.

B. Product Certificates: For short-circuit study software, certifying compliance with IEEE 399.

1.6 QUALITY ASSURANCE

A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are unacceptable.

B. Short-Circuit Study Software Developer Qualifications: An entity that owns and markets computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.

1. The computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.

C. Short-Circuit Study Specialist Qualifications: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.

D. Field Adjusting Agency Qualifications: An independent agency, with the experience and capability to adjust overcurrent devices and to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE

A. Comply with IEEE 399 and IEEE 551.

B. Analytical features of fault-current-study computer software program shall have the capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

C. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output.

2.2 SHORT-CIRCUIT STUDY REPORT CONTENTS

A. Executive summary.

B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of the computer printout.

C. One-line diagram, showing the following:

1. Protective device designations and ampere ratings.

2. Cable size and lengths.
3. Transformer kilovolt ampere (kVA) and voltage ratings.
4. Motor and generator designations and kVA ratings.
5. Switchgear, switchboard, motor-control center, and panelboard designations.

D. Comments and recommendations for system improvements, where needed.

E. Protective Device Evaluation:

1. Evaluate equipment and protective devices and compare to short-circuit ratings.
2. Tabulations of circuit breaker, fuse, and other protective device ratings versus calculated short-circuit duties.
3. For 600-V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
4. For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in the standards to 1/2-cycle symmetrical fault current.
5. Verify adequacy of phase conductors at maximum three-phase bolted fault currents; verify adequacy of equipment grounding conductors and grounding electrode conductors at maximum ground-fault currents. Ensure that short-circuit withstand ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.

F. Short-Circuit Study Input Data: As described in "Power System Data" Article in the Evaluations.

G. Short-Circuit Study Output:

1. Low-Voltage Fault Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:

    a. Voltage.
    b. Calculated fault-current magnitude and angle.
    c. Fault-point X/R ratio.
    d. Equivalent impedance.

2. Momentary Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:

    a. Voltage.
    b. Calculated symmetrical fault-current magnitude and angle.
    c. Fault-point X/R ratio.
    d. Calculated asymmetrical fault currents:

        1) Based on fault-point X/R ratio.
        2) Based on calculated symmetrical value multiplied by 1.6.
        3) Based on calculated symmetrical value multiplied by 2.7.

3. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:

    a. Voltage.
    b. Calculated symmetrical fault-current magnitude and angle.
    c. Fault-point X/R ratio.
    d. No AC Decrement (NACD) ratio.
    e. Equivalent impedance.
    f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
    g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Obtain all data necessary for the conduct of the study.

1. Verify completeness of data supplied on the one-line diagram. Call any discrepancies to the attention of Architect.
2. For equipment provided that is Work of this Project, use characteristics submitted under the provisions of action submittals and information submittals for this Project.
3. For relocated equipment and that which is existing to remain, obtain required electrical distribution system data by field investigation and surveys, conducted by qualified technicians and engineers. The qualifications of technicians and engineers shall be qualified as defined by NFPA 70E.

B. Gather and tabulate the following input data to support the short-circuit study. Comply with recommendations in IEEE 551 as to the amount of detail that is required to be acquired in the field. Field data gathering shall be under the direct supervision and control of the engineer in charge of performing the study, and shall be by the engineer or its representative who holds NETA ETT Level III certification or NICET Electrical Power Testing Level III certification.

1. Product Data for Project's overcurrent protective devices involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Obtain electrical power utility impedance at the service.
3. Power sources and ties.
4. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
5. For reactors, provide manufacturer and model designation, voltage rating, and impedance.
6. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip, SCCR, current rating, and breaker settings.
7. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
8. Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
9. Motor horsepower and NEMA MG 1 code letter designation.
10. Cable sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).

3.2 SHORT-CIRCUIT STUDY

A. Perform study following the general study procedures contained in IEEE 399.

B. Calculate short-circuit currents according to IEEE 551.

C. Base study on the device characteristics supplied by device manufacturer.

D. The extent of the electrical power system to be studied is indicated on Drawings.

E. Begin short-circuit current analysis at the service, extending down to the system overcurrent protective devices as follows:

1. To normal system low-voltage load buses where fault current is 10 kA or less.

2. Exclude equipment rated 240-V ac or less when supplied by a single transformer rated less than 125 kVA.

F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study all cases of system-switching configurations and alternate operations that could result in maximum fault conditions.

G. The calculations shall include the ac fault-current decay from induction motors, synchronous motors, and asynchronous generators and shall apply to low- and medium-voltage, three-phase ac systems. The calculations shall also account for the fault-current dc decrement, to address the asymmetrical requirements of the interrupting equipment.

1. For grounded systems, provide a bolted line-to-ground fault-current study for areas as defined for the three-phase bolted fault short-circuit study.

H. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault at each of the following:

1. Electric utility's supply termination point.
2. Incoming switchgear.
3. Unit substation primary and secondary terminals.
4. Low-voltage switchgear.
5. Motor-control centers.
6. Control panels.
7. Standby generators and automatic transfer switches.
8. Branch circuit panelboards.
9. Disconnect switches.

3.3 ADJUSTING

A. Make minor modifications to equipment as required to accomplish compliance with short-circuit study.

3.4 DEMONSTRATION

A. Train Owner's operating and maintenance personnel in the use of study results.

END OF SECTION 26 05 72

SECTION 260573 - OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY

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 computer-based, fault-current and overcurrent protective device coordination studies. Protective devices shall be set based on results of the protective device coordination study.

1. Coordination of series-rated devices is permitted where indicated on Drawings.

1.3 SUBMITTALS

A. Product Data: For computer software program to be used for studies.

B. Product Certificates: For coordination-study and fault-current-study computer software programs, certifying compliance with IEEE 399.

C. Qualification Data: For coordination-study specialist.

D. Other Action Submittals: The following submittals shall be made after the approval process for system protective devices has been completed. Submittals [shall] [may] be in digital form.

1. Coordination-study input data, including completed computer program input data sheets.
2. Study and Equipment Evaluation Reports.
3. Coordination-Study Report.

1.4 QUALITY ASSURANCE

A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are not acceptable.

B. Coordination-Study Specialist Qualifications: An entity experienced in the application of computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.

1. Professional engineer, licensed in the state where Project is located, shall be responsible for the study. All elements of the study shall be performed under the direct supervision and control of engineer.

C. Comply with IEEE 242 for short-circuit currents and coordination time intervals.

D. Comply with IEEE 399 for general study procedures.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE DEVELOPERS

A. Available Computer Software Developers: Subject to compliance with requirements, companies offering computer software programs that may be used in the Work include, but are not limited to, the following:

B. Computer Software Developers: Subject to compliance with requirements, provide products by one of the following:

C. Basis-of-Design Product: Subject to compliance with requirements, provide:

1. SKM Systems Analysis, Inc.

2.2 COMPUTER SOFTWARE PROGRAM REQUIREMENTS

A. Comply with IEEE 399.

B. Analytical features of fault-current-study computer software program shall include "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

C. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices and shall demonstrate selective coordination by computer-generated, time-current coordination plots.

1. Optional Features:

a. Arcing faults.
b. Simultaneous faults.
c. Explicit negative sequence.
d. Mutual coupling in zero sequence.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance. Devices to be coordinated are indicated on Drawings.

1. Proceed with coordination study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to coordination study may not be used in study.

3.2 POWER SYSTEM DATA

A. Gather and tabulate the following input data to support coordination study:

1. Product Data for overcurrent protective devices specified in other Division 26 Sections and involved in overcurrent protective device coordination studies. Use equipment des-

ignation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.

2. Impedance of utility service entrance.
3. Electrical Distribution System Diagram: In hard-copy and electronic-copy formats, showing the following:

    a. Circuit-breaker and fuse-current ratings and types.
    b. Relays and associated power and current transformer ratings and ratios.
    c. Transformer kilovolt amperes, primary and secondary voltages, connection type, impedance, and X/R ratios.
    d. Generator kilovolt amperes, size, voltage, and source impedance.
    e. Cables: Indicate conduit material, sizes of conductors, conductor material, insulation, and length.
    f. Busway ampacity and impedance.
    g. Motor horsepower and code letter designation according to NEMA MG 1.

4. Data sheets to supplement electrical distribution system diagram, cross-referenced with tag numbers on diagram, showing the following:

    a. Special load considerations, including starting inrush currents and frequent starting and stopping.
    b. Transformer characteristics, including primary protective device, magnetic inrush current, and overload capability.
    c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.
    d. Generator thermal-damage curve.
    e. Ratings, types, and settings of utility company's overcurrent protective devices.
    f. Special overcurrent protective device settings or types stipulated by utility company.
    g. Time-current-characteristic curves of devices indicated to be coordinated.
    h. Manufacturer, frame size, interrupting rating in amperes rms symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.
    i. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.
    j. Panelboards, switchboards, motor-control center ampacity, and interrupting rating in amperes rms symmetrical.

3.3 FAULT-CURRENT STUDY

A. Calculate the maximum available short-circuit current in amperes rms symmetrical at circuit-breaker positions of the electrical power distribution system. The calculation shall be for a current immediately after initiation and for a three-phase bolted short circuit at each of the following:

    1. Switchgear and switchboard bus.
    2. Distribution panelboard.
    3. Branch circuit panelboard.

B. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Include studies of system-switching configurations and alternate operations that could result in maximum fault conditions.

C. Calculate momentary and interrupting duties on the basis of maximum available fault current.

D. Calculations to verify interrupting ratings of overcurrent protective devices shall comply with IEEE 241 and IEEE 242.

1. Transformers:

a. ANSI C57.12.10.
b. ANSI C57.12.22.
c. ANSI C57.12.40.
d. IEEE C57.12.00.
e. IEEE C57.96.

2. Low-Voltage Circuit Breakers: IEEE 1015 and IEEE C37.20.1.
3. Low-Voltage Fuses: IEEE C37.46.

E. Study Report:

1. Show calculated X/R ratios and equipment interrupting rating (1/2-cycle) fault currents on electrical distribution system diagram.

F. Equipment Evaluation Report:

1. For 600-V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
2. For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in the standards to 1/2-cycle symmetrical fault current.
3. Verify adequacy of phase conductors at maximum three-phase bolted fault currents; verify adequacy of equipment grounding conductors and grounding electrode conductors at maximum ground-fault currents. Ensure that short-circuit withstand ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.

3.4 COORDINATION STUDY

A. Perform coordination study using approved computer software program. Prepare a written report using results of fault-current study. Comply with IEEE 399.

1. Calculate the maximum and minimum 1/2-cycle short-circuit currents.
2. Calculate the maximum and minimum interrupting duty (5 cycles to 2 seconds) short-circuit currents.
3. Calculate the maximum and minimum ground-fault currents.

B. Comply with IEEE 241 recommendations for fault currents and time intervals.

C. Transformer Primary Overcurrent Protective Devices:

1. Device shall not operate in response to the following:

a. Inrush current when first energized.
b. Self-cooled, full-load current or forced-air-cooled, full-load current, whichever is specified for that transformer.
c. Permissible transformer overloads according to IEEE C57.96 if required by unusual loading or emergency conditions.

2. Device settings shall protect transformers according to IEEE C57.12.00, for fault currents.

D. Motors served by voltages more than 600 V shall be protected according to IEEE 620.

E. Conductor Protection: Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and conductor melting curves in IEEE 242. Demonstrate that equipment withstands the maximum short-circuit current for a time equivalent to the tripping time of the primary relay protection or total clearing time of the fuse. To determine temperatures that damage insulation, use curves from cable manufacturers or from listed standards indicating conductor size and short-circuit current.

F. The arc flash study shall analyze the Flash Boundary Distance and the range of incident energy based on the calculated available fault current range at each device.

1. Provide Arc Flash Hazard Warning labels printed in color on adhesive backed nylon labels for all electrical equipment identified on the one line drawings. Also include the system operating voltage and date of issue.

G. Coordination-Study Report: Prepare a written report indicating the following results of coordination study:

1. The results of the power system study shall be summarized in a final report, stamped and signed by a professional engineer. Six (6) bound copies in 3-ring binders of the final report along with a disk of the database, libraries and reports shall be submitted to Qualcomm. The report shall include the following sections:

a. Descriptions, purpose, basis, and scope of study.
b. General summary evaluation of the findings and recommendations.

1) Tabulations of circuit breaker, fuse and other protective device ratings versus calculated short circuit duties, and commentary regarding the equipment to exceed the calculated values by 25%.
2) Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip settings, fuse selection, and commentary regarding same to maximize selective coordination and minimize incident energy. Graphically illustrate on log-log paper that adequate time separation exists between series devices. Plot the specific time-current characteristics of each protective device in such a manner that all applicable upstream devices will be clearly depicted on one sheet with no more than six overcurrent protective devices on a single plot.
3) Surge arrestor coordination study.
4) Fault current calculations including a definition of terms and guide for interpretation of computer printout.
5) Show, on the one-line diagram:

a) All electrical equipment and wring to be protected by the overcurrent devices including both breakers and fuses. Multiple one-line diagrams may be used if required to clearly present all of the require data.
b) Calculated fault impedance, X/R ratios, and short circuit values at all connected buses on the one line diagram.
c) Breaker and fuse ratings.
d) Transformer kVA and voltage ratings, percent impedance, X/R ratios, and wiring connections.
e) Voltage at each bus.
f) Identification of each bus.
g) Conductors per phase, conductor's size, length, and ampacity.
h) Arc flash boundary.
i) Incident energy in ca/cm2.

2. Tabular Format of Settings Selected for Overcurrent Protective Devices:

a. Device tag.
b. Relay-current transformer ratios; and tap, time-dial, and instantaneous-pickup values.
c. Circuit-breaker sensor rating; and long-time, short-time, and instantaneous settings.
d. Fuse-current rating and type.
e. Ground-fault relay-pickup and time-delay settings.

3. Coordination Curves: Prepared to determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for the switching schemes and for emergency periods where the power source is local generation. Show the following information:

a. Device tag.
b. Voltage and current ratio for curves.
c. Three-phase and single-phase damage points for each transformer.
d. No damage, melting, and clearing curves for fuses.
e. Cable damage curves.
f. Transformer inrush points.
g. Maximum fault-current cutoff point.

H. Completed data sheets for setting of overcurrent protective devices.

END OF SECTION 26 05 73

SECTION 26 05 74 – OVERCURRENT PROTECTIVE ARC-FLASH STUDY

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 a computer-based, arc-flash study to determine the arc-flash hazard distance and the incident energy to which personnel could be exposed during work on or near electrical equipment.

1.3 DEFINITIONS

A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

B. One-Line Diagram: A diagram which shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.

C. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion from the system.

D. SCCR: Short-circuit current rating.

E. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

1.4 ACTION SUBMITTALS

A. Product Data: For computer software program to be used for studies.

B. Study Submittals: Submit the following submittals after the approval of system protective devices submittals. Submittals shall be in digital form.

1. Arc-flash study input data, including completed computer program input data sheets.
2. Arc-flash study report; signed, dated, and sealed by a qualified professional engineer.

    a. Submit study report for action prior to receiving final approval of the distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that the selection of devices and associated characteristics is satisfactory.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Arc-Flash Study Specialist.

B. Product Certificates: For arc-flash hazard analysis software, certifying compliance with IEEE 1584 and NFPA 70E.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1. Maintenance procedures according to requirements in NFPA 70E shall be provided in the equipment manuals.
2. Operation and Maintenance Procedures: In addition to items specified in Section 017823 "Operation and Maintenance Data," provide maintenance procedures for use by Owner's personnel that comply with requirements in NFPA 70E.

1.7 QUALITY ASSURANCE

A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are unacceptable.

B. Arc-Flash Study Software Developer Qualifications: An entity that owns and markets computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.

1. The computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.

C. Arc-Flash Study Specialist Qualifications: Professional engineer in charge of performing the study, analyzing the arc flash, and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.

D. Field Adjusting Agency Qualifications: An independent agency, with the experience and capability to adjust overcurrent devices and to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE DEVELOPERS

A. Comply with IEEE 1584 and NFPA 70E.

B. Analytical features of device coordination study computer software program shall have the capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

2.2 ARC-FLASH STUDY REPORT CONTENT

A. Executive summary.

B. Study descriptions, purpose, basis and scope.

C. One-line diagram, showing the following:

1. Protective device designations and ampere ratings.
2. Cable size and lengths.
3. Transformer kilovolt ampere (kVA) and voltage ratings.
4. Motor and generator designations and kVA ratings.
5. Switchgear, switchboard, motor-control center and panelboard designations.

D. Study Input Data: As described in "Power System Data" Article.

E. Short-Circuit Study Output: As specified in "Short Circuit Study Output" Paragraph in "Short-Circuit Study Report Contents" Article in Section 260572 "Overcurrent Protective Device Short-Circuit Study."

F. Protective Device Coordination Study Report Contents: As specified in "Protective Device Coordination Study Report Contents" Article in Section 260573 "Overcurrent Protective Device Coordination Study."

G. Arc-Flash Study Output:

1. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:

a. Voltage.
b. Calculated symmetrical fault-current magnitude and angle.
c. Fault-point X/R ratio.
d. No AC Decrement (NACD) ratio.
e. Equivalent impedance.
f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis.

H. Incident Energy and Flash Protection Boundary Calculations:

1. Arcing fault magnitude.
2. Protective device clearing time.
3. Duration of arc.
4. Arc-flash boundary.
5. Working distance.
6. Incident energy.
7. Hazard risk category.
8. Recommendations for arc-flash energy reduction.

I. Fault study input data, case descriptions, and fault-current calculations including a definition of terms and guide for interpretation of the computer printout.

2.3 ARC-FLASH WARNING LABELS

A. Comply with requirements in Section 260553 "Identification for Electrical Systems" for self-adhesive equipment labels. Produce a 3.5-by-5-inch (76-by-127-mm) self-adhesive equipment label for each work location included in the analysis.

B. The label shall have an orange header with the wording, "WARNING, ARC-FLASH HAZARD," and shall include the following information taken directly from the arc-flash hazard analysis:

1. Location designation.
2. Nominal voltage.
3. Flash protection boundary.
4. Hazard risk category.
5. Incident energy.
6. Working distance.
7. Engineering report number, revision number, and issue date.

C. Labels shall be machine printed, with no field-applied markings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine Project overcurrent protective device submittals. Proceed with arc-flash study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to arc-flash study may not be used in study.

3.2 ARC-FLASH HAZARD ANALYSIS

A. Comply with NFPA 70E and its Annex D for hazard analysis study.

B. Preparatory Studies:

1. Short-Circuit Study Output: As specified in "Short-Circuit Study Output" Paragraph in "Short-Circuit Study Report Contents" Article in Section 260572 "Overcurrent Protective Device Short-Circuit Study."
2. Protective Device Coordination Study Report Contents: As specified in "Protective Device Coordination Study Report Contents" Article in Section 260573 "Overcurrent Protective Device Coordination Study."

C. Calculate maximum and minimum contributions of fault-current size.

1. The minimum calculation shall assume that the utility contribution is at a minimum and shall assume no motor load.
2. The maximum calculation shall assume a maximum contribution from the utility and shall assume motors to be operating under full-load conditions.

D. Calculate the arc-flash protection boundary and incident energy at locations in the electrical distribution system where personnel could perform work on energized parts.

E. Include medium- and low-voltage equipment locations, except equipment rated 240-V ac or less fed from transformers less than 125 kVA.

F. Safe working distances shall be specified for calculated fault locations based on the calculated arc-flash boundary, considering incident energy of 1.2 cal/sq.cm.

G. Incident energy calculations shall consider the accumulation of energy over time when performing arc-flash calculations on buses with multiple sources. Iterative calculations shall take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors and generators shall be decremented as follows:

1. Fault contribution from induction motors should not be considered beyond three to five cycles.
2. Fault contribution from synchronous motors and generators should be decayed to match the actual decrement of each as closely as possible (e.g., contributions from permanent magnet generators will typically decay from 10 per unit to three per unit after 10 cycles).

H. Arc-flash computation shall include both line and load side of a circuit breaker as follows:

1. When the circuit breaker is in a separate enclosure.
2. When the line terminals of the circuit breaker are separate from the work location.

I. Base arc-flash calculations on actual overcurrent protective device clearing time. Cap maximum clearing time at two seconds based on IEEE 1584, Section B.1.2.

3.3 POWER SYSTEM DATA

A. Obtain all data necessary for the conduct of the arc-flash hazard analysis.

1. Verify completeness of data supplied on the one-line diagram on Drawings. Call discrepancies to the attention of Architect.
2. For new equipment, use characteristics submitted under the provisions of action submittals and information submittals for this Project.
3. For existing equipment, whether or not relocated, obtain required electrical distribution system data by field investigation and surveys, conducted by qualified technicians and engineers.

B. Electrical Survey Data: Gather and tabulate the following input data to support study. Comply with recommendations in IEEE 1584 and NFPA 70E as to the amount of detail that is required to be acquired in the field. Field data gathering shall be under the direct supervision and control of the engineer in charge of performing the study, and shall be by the engineer or its representative who holds NETA ETT Level III certification or NICET Electrical Power Testing Level III certification.

1. Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Obtain electrical power utility impedance at the service.
3. Power sources and ties.
4. Short-circuit current at each system bus, three phase and line-to-ground.
5. Full-load current of all loads.
6. Voltage level at each bus.
7. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in per cent, and phase shift.
8. For reactors, provide manufacturer and model designation, voltage rating and impedance.
9. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.

10. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
11. For relays, provide manufacturer and model designation, current transformer ratios, potential transformer ratios, and relay settings.
12. Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
13. Motor horsepower and NEMA MG 1 code letter designation.
14. Low-voltage cable sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).
15. Medium-voltage cable sizes, lengths, conductor material, and cable construction and metallic shield performance parameters.

3.4 LABELING

A. Apply one arc-flash label for 600-V ac, 480-V ac, and applicable 208-V ac panelboards and disconnects and for each of the following locations:

1. Motor-control center.
2. Low-voltage switchboard.
3. Switchgear.
4. Medium-voltage switch.
5. Control panel.

3.5 APPLICATION OF WARNING LABELS

A. Install the arc-fault warning labels under the direct supervision and control of the Arc-Flash Study Specialist.

3.6 DEMONSTRATION

A. Engage the Arc-Flash Study Specialist to train Owner's maintenance personnel in the potential arc-flash hazards associated with working on energized equipment and the significance of the arc-flash warning labels.

END OF SECTION 26 05 74

SECTION 26 05 75 - ACCEPTANCE TESTING

PART 1 - GENERAL

1.1 It is the intent of these acceptance tests to assure that all Contractor supplied equipment is operational and within industry and manufacturer's tolerances and is installed in accordance with designed specifications.

1.2 The acceptance tests and inspections shall determine suitability for energization of switchgear and cables.

1.3 Items that shall be checked, inspected, and tested include, but are not limited to, the following:

A. SF6 switches and overcurrent protection devices

B. Relays

C. Ammeters

D. Voltmeter

E. Wattmeters

F. Varmeters

G. Voltage transducer

H. Current transducers

I. Watt transducers

J. Var transducers

K. AUX compartment with control power transformer

L. AUX compartment with potential transformer

M. AUX compartment with batteries and rectifier

N. Sets of Current Transformers

O. Surge arrestors

P. Grounding system

Q. Power/Lighting panelboards

R. 15kV rated cable

S. 600V rated cable

T. Substations and distribution switchgear

U. Automatic Transfer Switches

1.4 APPLICABLE CODES

A. All inspections and tests shall be in accordance with the following applicable codes and standards except as provided otherwise herein.

1. National Electrical Code - NEC 2005 Edition.
2. National Electrical Manufacturer's Association - NEMA.
3. American Society for Testing and Materials - ASTM.
4. Institute of Electrical and Electronic Engineers - IEEE.
5. National Electrical Testing Association - NETA.
6. American National Standards Institute - ANSI:

    a. C2, National Electrical Safety Code
    b. Z244-1, American National Standard for Personnel Protection

7. State Codes and Ordinances.
8. Insulated Cable Engineers Association - ICEA.
9. Association of Edison Illuminating Companies - AEIC.
10. Occupational Safety and Health Administration:

    a. Part 1910, Subpart S, 1910.308
    b. Part 1926, Subpart V, 1926.950 through 1926.960

11. National Fire Protection Association - NFPA:

    a. ANSI/NFPA 70B, Electrical Equipment Maintenance
    b. NFPA 70E, Electrical Safety Requirements for Employee Workplaces
    c. ANSI/NFPA 70, National Electrical Code 2005 Edition
    d. ANSI/NFPA 78, Lightning Protection Code
    e. ANSI/NFPA 101, Life Safety Code

12. All inspections and tests shall utilize the following references:

    a. Project Design Specification.
    b. Project Design Drawings.
    c. Manufacturer's instruction manuals applicable to each particular apparatus.

1.5 QUALIFICATIONS OF TESTING AGENCY

A. The testing firm shall be an independent testing organization which can function as an unbiased testing authority, professionally independent of the manufacturers, suppliers, and installers of equipment or systems evaluated by the testing firm.

B. The testing firm shall be regularly engaged in the testing of electrical equipment devices, installations, and systems.

C. The testing firm shall meet federal OSHA criteria for accreditation of testing laboratories, Title 29, Parts 1907, 1910, and 1936. Full membership in the National Electrical Testing Association constitutes proof of such criteria.

D. The lead, on site, technical person shall be currently certified by the National Electrical Testing Associate (NETA) in Electrical Power Distribution System Testing.

E. Testing firm shall utilize only full-time technicians who are regularly employed by the firm for testing services. Electrically unskilled employees are not permitted to perform testing or assistance of any kind. Electricians may assist, but may not perform testing and/or inspection services.

F. The testing firm shall submit proof of the above qualifications.

G. The testing firm shall be an independent organization as defined by OSHA Title 29, Part 1936 and the National Electrical Testing Association.

H. All instruments used by the testing firm to evaluate electrical performance shall meet NETA's Specifications for Test Instruments. (See Section 1.7 of this specification).

I. The terms used herewith such as Test Agency, Testing Laboratory, or Contractor Test Company, shall be construed to mean testing firm.

1.6 RESPONSIBILITIES

A. The Contractor shall notify the Owner's Representative prior to commencement of any testing.

B. Any system, material or workmanship which is found defective on the basis of acceptance tests shall be reported.

C. The testing firm shall maintain a written record of all tests and upon completion of project, assemble and certify a final test report.

D. A stable source of 60 hertz power shall be provided for testing purposes by the Contractor. All tests shall be witnessed by Owner's Representative and a minimum of 14 days notice shall be provided.

1.7 TEST EQUIPMENT

A. Test Instrument Calibration

1. The testing firm shall have a calibration program which assures that all applicable test instrumentation are maintained within rated accuracy.
2. The accuracy shall be directly traceable to the National Bureau of Standards.
3. Instruments shall be calibrated in accordance with the following frequency schedule:

    a. Field instruments: Analog - 6 months maximum
    Digital - 12 months maximum
    b. Laboratory Instruments - 2months
    c. Leased specialty equipment - 12 months (where accuracy is guaranteed by lessor)

4. Dated calibration labels shall be visible on all test equipment.
5. Records must be kept up-to-date which show date and results of instruments calibrated or tested.
6. An up-to-date instrument calibration instruction and procedure will be maintained for each test instrument.
7. Calibrating standard shall be of higher accuracy than that of the instrument tested.

1.8 TEST REPORTS

A. The test report shall include the following:

1. Summary of project.
2. Description of equipment/device tested.
3. Description of test, including date, time, and duration of test.
4. Test results.
5. Conclusions and recommendations.
6. Appendix, including appropriate test forms.
7. Identification of test equipment used.
8. Signature of responsible test organization authority.
9. Signature of the person witnessing the tests.
10. Furnish five copies of the complete report to the Owner's Representative no later than thirty (30) days after completion of project unless otherwise directed.

1.9 SAFETY AND PRECAUTIONS

A. Safety practices shall include, but are not limited to, the following requirements:

1. Occupational Safety and Health Act of 1970 - OSHA.
2. Accident Prevention Manual for Industrial Operations, National Safety Council, Chapter 4.
3. Applicable State safety operating procedures.
4. NETA Safety/Accident Prevention Program.
5. Owner's safety practices.
6. National Fire Protection Association - NFPA 70E.
7. ANSI Z244.1 American National Standards for Personnel Protection.

B. All tests shall be performed with apparatus de-energized except where otherwise specifically required.

C. The testing firm shall have a designated safety representative on the project to supervise operations with respect to safety.

PART 2 - PROTECTIVE DEVICE COORDINATION STUDY

2.1 A protective coordination study shall be performed using SKM's Dapper or equal software to select or check the selection of power fuse ratings, protective relay characteristics and settings, ratios, and characteristics of associated voltage breaker trip characteristics and settings.

2.2 The coordination study shall include all voltage classes of equipment from the Owner's main incoming line and down to and including panelboards. The entire electrical system shall be included in the coordination study including all emergency feeders. Verify characteristics and settings of existing devices in the field and from the manufacturer.

2.3 The time-current characteristics of the specified protective devices shall be plotted on the appropriate log-log paper. The plots shall include complete titles, representative one-line diagrams of both buildings and legends, associated relays or fuse characteristics, significant motor starting characteristics, complete parameters of transformers, complete operating bands of low voltage circuit breaker trip curves, and fuse curves. The coordination plots shall indicate the types of protective devices selected, proposed relay taps, time dial and instantaneous trip settings, cable damage curves, symmetrical and asymmetrical fault currents. All requirements of the current National Electrical Code shall be adhered to. Reasonable coordination intervals and separation of characteristic curves shall be maintained. Separate coordination plots for phase and ground protective devices shall be provided on a system basis. Separate curves shall be used to clearly indicate the coordination achieved for feeder breakers with downstream fuses and circuit breakers in switchgear and substations. There shall be a maximum of six protective devices per plot.

2.4 The selection and setting of the protective devices shall be provided separately in a tabulated form listing circuit identification, IEEE device number, current transformer ratios, manufacturer, type, range of adjustment, and recommended settings. Discrepancies, problem areas, or inadequacies shall be promptly brought to the project Owner's Representative's attention.

2.5 Five copies of coordination curves and tabulated data indicating selection and settings of protective devices shall be submitted to the Owner's Representative for approval.

PART 3 - EQUIPMENT VERIFICATIONS, TESTS, AND CALIBRATIONS

3.1 GENERAL

A. As part of the contract, the Contractor shall perform tests of installed work as herein specified and specified in other Sections of these Specifications.

B. The Contractor shall provide all materials, equipment, labor and technical supervision to perform such tests and inspections.

C. All tests shall be performed in compliance with the recommendations and requirements of the National Electrical Testing Association, Inc. (NETA), and applicable codes and standards.

D. Upon completion of the tests and inspections noted in these Specifications, a label shall be attached to all serviced devices. These labels shall indicate date serviced and the service company responsible.

E. The test and inspections shall determine suitability for continued reliable operation.

F. All tests shall be conducted in the presence of the Owner's Representative. Provide a minimum of two weeks notice to the Owner's Representative.

G. Furnish the necessary equipment and personnel to perform all required tests of all wiring and connections for continuity, short circuit, and improper grounds. Included, but not limited to, the following systems: substations, SF6 switches, air interrupting switches, low voltage main and feeder circuit breakers, interlocking controls, panelboards, distribution transformers, branch circuits.

3.2 SWITCHGEAR, SUBSTATIONS, DISTRIBUTION BOARDS, AND EMERGENCY SYSTEM-GENERAL

A. Visual and mechanical inspection:

1. Inspect for physical damage and code violations.
2. Clean interior and exterior surfaces.
3. Inspect for proper alignment, anchorage, and grounding.
4. Check tightness of accessible bolted bus joints by torque wrench method. Tighten connections in accordance with industry standard torque levels.
5. Make closure attempt on locked open devices. Make opening attempt on locked closed devices.
6. Make exchange with devices operated in off-normal positions.

B. Electrical tests:

1. Measure insulation resistance of each bus section phase-to-phase and phase-to-ground.
2. Inspect all accessible bus joints and cable connections by infrared scanner to detect

loose or high-resistance connections and other circuit anomalies.
3. Inspect correctness of control wiring.

3.3 MEDIUM VOLTAGE SF6 SWITCHES AND OVERCURRENT PROTECTION

A. Visual and mechanical inspection:

1. Inspect for physical condition.
2. Inspect alignment and grounding.
3. Perform mechanical operator and contact alignment tests on the breaker and its operating mechanism in accordance with manufacturer's instructions.
4. Perform insulation resistance test on control wiring.
5. Clean mechanism, insulating surfaces and contacts.
6. Check pressure of all SF6 containers if applicable.

B. Electrical Tests

1. Measure contact resistance.
2. Trip overcurrent protective device by operation of each protective device.
3. Perform an insulation resistance test phase-to-ground, phase-to-phase and across open contacts.
4. Perform insulation resistance test in accordance with Doble procedure.
5. Perform timing test with Travel Analyzer to insure proper contact overtravel and pressure.
6. Test all SF6 pressure alarm and trip relays.

3.4 SURGE ARRESTERS

A. Visual and mechanical inspection:

1. Inspect for physical damage such as chipped or fractured porcelain.
2. Inspect ground and discharge counter connections for integrity.

B. Electrical tests:

1. Perform a 60Hz sparkover test.
2. Perform a radio influence voltage (RIV) test.
3. Perform an insulation power factor test.
4. Perform ground continuity test to ground grid system.

3.5 BATTERY SYSTEM

A. Visual and mechanical inspection:

1. Inspect for physical damage, anchorage, electrolyte leakage and level.
2. Check intercell bus link and cable connection integrity for tightness and corrosion.

B. Electrical tests:

1. Measure system charging voltage and each individual cell voltage.
2. Measure electrolyte specific gravity.
3. Perform infrared scan of the intracell links cable connections under current discharge conditions.

3.6 INSTRUMENT TRANSFORMER

A. Visual and mechanical inspection:

1. Inspect for physical damage and connection tightness.
2. Check transformer nameplate with singleline diagram.
3. Check proper operation of grounding or shorting devices.

B. Electrical tests:

1. Measure current transformer ratio by primary current injection.
2. Measure potential transformer ratio.
3. Measure insulation resistance primary-to-ground, secondary-to-ground and primary-to-secondary.
4. Verify secondary wiring connections by secondary current injection.
5. Verify transformer polarity markings.
6. Perform current transformer saturation test. Plot transformer voltage current curve.

3.7 METERING AND INSTRUMENTATION

A. Visual and mechanical inspection:

1. Check all devices for physical damage and connection tightness.
2. Verify meter nameplate designation.

B. Electrical tests:

1. Check calibration of all panel meters at zero, midscale and full scale deflections by transfer standard.
2. Test Digital Instrumentation Package per manufacturer’s requirements.
3. Verify all instrument multipliers and scale factors.
4. Check polarities and correct rotations.

3.8 CONTROL POWER TRANSFORMERS - ENCAPSULATED TYPE

A. Visual and mechanical inspection:

1. Inspect for physical damage, proper installation, anchorage, and grounding.
2. Clean interior and all bushing and insulator surfaces.
3. Verify proper auxiliary device operation such as fans and indicators.
4. Check tightness of accessible bolted electrical joints. Tighten connections in accordance with industry standards.

B. Electrical tests:

1. Perform insulation resistance tests winding-to-winding and winding-to-ground. Apply appropriate guard circuit over all bushings.
2. Perform dielectric absorption test winding-to-winding and winding-to ground for ten (10) minutes. Compute the polarization index.
3. Perform turns ratio test between windings for all top positions.
4. Perform insulation power factor tests on all high and low-voltage windings.
5. Check output voltages.

3.9 PROTECTIVE RELAYS

A. Visual and mechanical inspection:

1. Inspect relays for physical damage, presence of foreign material, moisture, condition of spiral spring, disc clearance and corrosion.
2. Clean cover glass interior and relay components.
3. Check for freedom of movement, proper travel and alignment, and tightness of mounting hardware and top screws.

B. Electrical test:

1. Perform insulation resistance tests on each circuit branch to frame.
2. Perform the following tests at the settings specified by Owner's Representative:

    a. Pickup parameters on each operating element.
    b. Timing at three (3) points on time dial curve.
    c. Pickup target and seal in units.
    d. Special test as required to check operation of restraint, and other elements per manufacturer's instructions.

3. Perform phase angle and magnitude contribution tests on all differential type relays after energization to vectorially prove proper polarity and connection.
4. Check polarity and correctness of control wiring.

C. Relay calibration and tests:

1. Two relay wiring tests shall be made.

    a. Primary circuit polarity test shall include a DC test from the current transformer to each terminal block and relay terminal.
    b. Relay and circuit breaker operation test by application of power from the portable relay test set.

D. Relay testing shall be accomplished after completion of the switchgear installation, using standard portable test set equipment and the relay manufacturer's testing directions and parameters to determine conformance of the relay to the time-overcurrent information given in the manufacturer's performance curves and the tap settings provided by coordination study. Overcurrent relay testing shall include:

1. Zero set tests.
2. Pickup tests.
3. Time-current characteristic (operation at currents 3 and 4 times the directed tap settings), and instantaneous at the directed tap setting.
4. Target and seal-in operation.

E. Target differential relays shall be tested similarly, except for the following additional tests:

1. Low voltage "through-currents" of approximately "full load" and "fault" magnitudes shall be circulated in HV busses. Bus differential relays shall not trip.
2. Low voltage currents shall be circulated within the differential zones of "low-fault" and "high-fault" magnitudes. Bus differential relays shall initiate tripping momentarily.

3.10 CABLES 15kV

A. Visual and mechanical inspections:

1. Inspect exposed section for tracking corona, and physical damage.

2. Clean all creepage from surfaces of termination.

B. Inspect shield grounding, cable support, and termination.

1. Perform infrared scan of all connections under loaded conditions.

C. Electrical tests:

1. Perform shield and conductor continuity test by ohmmeter method. Record ohmic value.
2. Perform insulation-resistance test of each cable with respect to ground and adjacent cables.
3. Perform DC hypotential test:

a. Test each conductor individually with all other conductors grounded. All shields to be grounded.
b. Corona at terminations will be suppressed with guard rings, field reduction spheres, or other suitable methods.
c. Apply DC hypotential in at least eight (8) equal increments until maximum test voltage is reached. Record DC leakage current at each step after a constant stabilization time, consistent with system charging current decay. Plot leakage current (X axis) versus voltage (Y axis) at each increment.
d. Raise the test conductor to a maximum test voltage and hold for a total of ten (10) minutes. Record readings of leakage current (Y axis) versus time (X axis) and plot on thirty (30) second intervals for the first two (2) minutes and every minute thereafter. Perform maximum voltage decrement test by reducing the applied voltage to zero and monitoring voltage decay versus time. Apply grounds upon completion to drain all absorpic potential to zero.
e. Test each conductor in accordance with Section E of AEIC C56.

3.11 LOW VOLTAGE CIRCUIT BREAKERS

A. Visual and mechanical inspection:

1. Inspect for physical condition.
2. Inspect alignment and grounding.
3. Perform mechanical operator and contact alignment tests on the breaker and its operating mechanism in accordance with manufacturer’s instructions.
4. Perform insulation resistance test on control wiring.
5. Clean mechanism, insulating surfaces and contacts.

B. Electrical tests:

1. Measure contact resistance.
2. Trip overcurrent protective device by operation of each protective device.
3. Perform an insulation resistance test phase-to-ground, phase-to-phase and across open contacts.
4. Perform insulation resistance test in accordance with Doble procedure.
5. Perform timing test with Travel Analyzer to insure proper contact overtravel and pressure.

3.12 CABLES, LOW VOLTAGE (600 VOLTS AND LESS)

A. Visual and mechanical inspections:

1. Inspect cables for physical damage and proper connection.
2. Torque test cable connection. Tighten connections in accordance with industry

standards.

3. Perform infrared scan of all connections under loaded conditions.

B. Electrical tests:

1. Perform insulation resistance test of each cable with respect to ground and adjacent cables.

3.13 GROUNDING SYSTEMS

A. Visual and mechanical inspection:

1. Inspect ground system connections for completeness and adequacy.

B. Electrical tests:

1. Perform ”fall of the potential” test per IEEE No. 81, Section 9.03 to determine the ground resistance between the main grounding system and all major electrical equipment frames, system neutral and/or derived neutral points.

3.14 INFRARED INSPECTION

A. All doors and cover shall be removed and upon completion of test be reinstalled by testing agency technicians.

B. A load bank shall be furnished to circulate low voltage currents of 400A magnitude through each bus, main breaker and feeder breaker. After two hours infrared scans shall be made of all bus joints. Problem area shall be photographed before and after corrections. After corrections, another current test of two hours duration shall be made. Again an infrared scan shall be made to confirm correct operation.

C. Upon completion, the switchgear shall be energized at 12kV. After 4 hours, infrared scans shall be made to determine areas of excessive corona. Problem area shall be treated the same as under B., above.

D. Upon completion of infrared scans, all covers and doors shall be reinstalled.

END OF SECTION 26 05 75

SECTION 26 09 23 - OCCUPANCY SENSORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general conditions, Division 1, and Basic Electrical Requirements (Section 26 05 00) are part of this section and the contract for this work and apply to this section as fully as if repeated herein.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 SCOPE

A. Contractor's work to include all labor, materials, tools, appliances, control hardware, sensor, wire, junction boxes and equipment necessary for and incidental to the delivery, installation and furnishing of a completely operational occupancy sensor lighting control system, as described herein.

1.3 EQUIPMENT QUALIFICATION

A. Products shall be manufactured by an ISO 9002 certified manufacturing facility and shall have a defect rate of less than 1/3 of 1%.

B. Wall switch products must be capable of withstanding the effects of inrush current. Submittals shall clearly indicate the method used.

1.4 SYSTEM DESCRIPTION

A. The objective of this section is to require the proper installation of the occupancy sensor based lighting control system such that lighting is turned off automatically after a reasonable time delay when a room or area is vacated.

B. The occupancy sensor based lighting control shall accommodate all conditions of space utilization and all irregular work hours and habits.

C. Contractor shall warrant all equipment furnished in accordance to this specification to be undamaged, free of defects in materials and workmanship, and in conformance with the specifications. The suppliers obligation shall include repair or replacement, and testing without charge to the owner, all or any parts of equipment which are found to be damaged, defective or non-conforming and returned to the supplier. The warranty shall commence upon the owner's acceptance of the project. Warranty on labor shall be for a minimum period of one (1) year.

1.5 QUALITY ASSURANCE AND STANDARDS

A. All work, material or equipment shall comply with the codes, ordinances and regulations of the local government having jurisdiction, including the regulations of serving utilities and any participating government agencies having jurisdiction.

B. All electrical work shall comply with the latest edition under enforcement, including all amendments, modifications, and supplements of the following codes and standards or other regulations which may apply:

1. American Disabilities Act (ADA)
2. American National Standards Institute (ANSI)
3. American Society for Testing and Materials (ASTM)
4. Institute of Electrical and Electronic Engineers (IEEE)
5. Local Code Enforcement Agency Requirements
6. National Electrical Code (NEC)
7. National Electrical Contractor's Association (NECA)
8. National Electrical Manufacturer's Association (NEMA)
9. National Electrical Testing Association (NETA)
10. National Fire Protection Association (NFPA)
11. Underwriter's Laboratories, Inc. (UL)
12. International Building Code (IBC)

No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. Any conflicts or changes required to the contract documents in order to obtain compliance with applicable codes shall be brought to the immediate attention of the Engineer, Architect, and Owner's Representative by the contractor.

C. All items shall be listed by Underwriter's Laboratories and shall bear the U.L. label.

D. Equipment shown to scale is approximate only and based upon a general class of equipment specified. The Contractor shall verify all dimensions and clearances prior to commencement of work.

E. The Contractor shall verify all points of connection with the manufacturer's requirements, instructions, or recommendations prior to installation. The actual dimensions, weights, clearance requirements and installation requirements shall be verified and coordinated by the contractor.

1.6 SUBMITTALS

A. Manufacturer shall substantiate conformance to this specification by supplying the necessary documents, performance data and wiring diagrams. Any deviations to this specification must be clearly stated by letter and submitted.

B. Submit a lighting plan clearly marked by manufacturer showing proper product, location and orientation of each sensor.

C. Submit any interconnection diagrams per major subsystem showing proper wiring.

D. Submit standard catalog literature, which includes performance specifications indicating compliance to the specification.

E. Catalog sheets must clearly state any load restrictions when used with electronic ballasts.

1.7 SYSTEM OPERATION

A. It shall be the contractor's responsibility to make all proper adjustments to assure owner's satisfaction with the occupancy system, or;

B. Factory Startup: It shall be the contractor's responsibility to engage a factory-authorized representative to verify all proper adjustments and train owner's personnel to ensure owner's satisfaction with the occupancy system. This service is provided at an additional cost.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Occupancy sensor manufacturer shall be The Watt Stopper.

2.2 PRODUCTS

A. All products shall be Watt Stopper product numbers:

1. Ceiling sensors: DT-300 or DT-355
2. Wall sensors: PW-200
3. Power and slave packs: BZ-50 or BZ-150
4. Inteliswitch: TS-400

B. Wall switch sensors shall be capable of detection of occupancy at desktop level up to 300SF, and gross motion up to 1000SF.

C. Wall switch sensors shall accommodate loads from 1 to 800 watts at 120V; 1 to 1200W at 277V and shall have 180 degree coverage capability.

D. Wall switch products shall utilize Zero Crossing Circuitry which increases relay life, protects from the effects of inrush current, and increases sensor's longevity.

E. Wall switch sensors shall have no leakage current to load, in manual or in Auto/Off mode for safety purposes and shall have voltage drop protection.

F. Where specified, wall switch sensors shall provide a field selectable option to convert sensor operation from automatic-ON to manual-ON.

G. Were specified, vandal resistant wall switch sensors shall utilize a hard lens with a minimum 1.0mm thickness. Products utilizing a soft lens will not be considered.

H. Passive infrared sensors shall utilize Pulse Count Processing and Digital Signature Analysis to respond only to those signals caused by human motion.

I. Passive infrared sensors shall utilize mixed signal ASIC which provides high immunity to false triggering from RFI (hand-held radios) and EMI (electrical noise on the line), superior performance, and greater reliability.

J. Passive infrared sensors shall have a multiple segmented Lodif Fresnel lens, in a multiple-tier configuration, with grooves-in to eliminate dust and residue build-up.

K. Where specified, passive infrared and dual technology sensors shall offer daylighting footcandle adjustment control and be able to accommodate dual level lighting.

L. Dual technology sensors shall be corner mounted to avoid detection outside the controlled area

when doors are left open.

M. Dual technology sensors shall consist of passive infrared and ultrasonic technologies for occupancy detection. Products that react to noise or ambient sound shall not be considered.

N. Ultrasonic sensors shall utilize Advanced Signal Processing to adjust the detection threshold dynamically to compensate for constantly changing levels of activity and air flow throughout controlled space.

O. Ultrasonic operating frequency shall be crystal controlled at 25kHz within □ 0.005% tolerance, 32kHz within □ 0.002% tolerance, or 40kHz □ 0.002% tolerance to assure reliable performance and eliminate sensor cross-talk. Sensors using multiple frequencies are not acceptable.

P. All sensors shall be capable of operating normally with electronic ballasts, PL lamp systems and rated motor loads.

Q. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air conditioner or heating fans.

R. All sensors shall have readily accessible, user adjustable settings for time delay and sensitivity. Settings shall be located on the sensor (not the control unit) and shall be recessed to limit tampering.

S. In the event of failure, a bypass manual override shall be provided on each sensor. When bypass is utilized, lighting shall remain on constantly or control shall divert to a wall switch until sensor is replaced. This control shall be recessed to prevent tampering.

T. All sensors shall provide an LED as a visual means of indication at all times to verify that motion is being detected during both testing and normal operation.

U. Were specified, sensor shall have an internal additional isolated relay with Normally Open, Normally Closed and Common outputs for use with HVAC control, Data Logging and other control options. Sensors utilizing separate components or specially modified units to achieve this function are not acceptable.

V. All sensors shall have UL rated, 94V-0 plastic enclosures.

2.3 CIRCUIT CONTROL HARDWARE –CU

A. Control Units - For ease of mounting, installation and future service, control unit(s) shall be able to externally mount through a 1/2" knock-out on a standard electrical enclosure and be an integrated, self-contained unit consisting internally of an isolated load switching control relay and a transformer to provide low-voltage power. Control unit shall provide power to a minimum of two (2) sensors.

B. Relay Contracts shall have ratings of:

1. 13A - 120 VAC Tungsten
2. 20A - 120 VAC Ballast
3. 20A - 277 VAC Ballast

C. Control wiring between sensors and controls units shall be Class II, 18-24 AWG, stranded U.L. Classified, PVC insulated or teflon jacketed cable suitable for use in plenums, were applicable.

D. Minimum acceptable wire gauge from the circuit control hardware relays shall be #14 AWG.

PART 3 - EXECUTION

3.1 INSTALLATION

A. It shall be the contractor's responsibility to locate and aim sensor in the correct location required for complete and proper volumetric coverage within the range of coverage(s) of controlled areas per the manufacturer's recommendations. Rooms shall have ninety (90) to one hundred (100) percent coverage to completely cover the controlled area to accommodate all occupancy habits of single or multiple occupants at any location within the room(s). The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the rooms which are to be provided with sensors. The contractor shall provide additional sensors if required to properly and completely cover the respective room.

B. It is the contractor's responsibility to arrange a pre-installation meeting with the manufacturer's factory authorized representative, at the owner's facility, to verify placement of sensors and installation criteria.

C. Proper judgment must be exercised in executing the installation so as to ensure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference of structural components. The contractor shall also provide, at the owner's facility, the training necessary to familiarize the owner's personnel with the operation, use, adjustment, and problem solving diagnosis of the occupancy sensing devices and systems.

END OF SECTION 26 09 23

SECTION 26 09 43 - DIGITAL LIGHTING CONTROL SYSTEM
WattStopper -- Digital Lighting Management

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Digital Lighting Controls

2. Relay Panels

3. Emergency Lighting Control (if applicable)

B. Related Sections:

2. Section 16140 - Wiring Devices: Receptacles

3. Section 16580 – Interior Lighting Fixtures, Lamps, and Ballasts: Fluorescent electronic dimming ballasts.

4. Section 15000 – Integrated Automation Building integrator shall provide integration of the lighting control system with Building Automation Systems.

5. Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section

6. Electrical Sections, including wiring devices, apply to the work of this Section.

C. Control Intent – Control Intent includes, but is not limited to:

1. Defaults and initial calibration settings for such items as time delay, sensitivity, fade rates, etc.

2. Initial sensor and switching zones

3. Initial time switch settings

4. Task lighting and receptacle controls

5. Emergency Lighting control (if applicable)

1.2 REFERENCES

A. American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE)

B. Underwriter Laboratories of Canada (ULC)

C. International Electrotechnical Commission (IEC)

D. International Organization for Standardization (ISO)

E. National Electrical Manufacturers Association (NEMA)

F. WD1 (R2005) - General Color Requirements for Wiring Devices.

G. Underwriters Laboratories, Inc. (UL)
   1. 20 – Plug Load Controls
   2. 508– Industrial Controls
   3. 916 – Energy Management Equipment.
   4. 924 – Emergency Lighting

2.2 SYSTEM DESCRIPTION & OPERATION

A. The Lighting Control and Automation system as defined under this section covers the following equipment:

   1. Digital Occupancy Sensors – Self-configuring, digitally addressable and calibrated occupancy sensors with LCD display and two-way active infrared (IR) communications.

   2. Digital Switches – Self-configuring, digitally addressable pushbutton on/off, dimming, and scene switches with two-way active infrared (IR) communications.

   3. Handheld remotes for personal control – One-button dimming, two-button on/off, or five-button scene remotes provide control using infrared communications. Remote may be configured in the field to control selected loads or scenes without special tools.

   4. Digital Daylighting Sensors – Single-zone closed loop, multi-zone open loop and single-zone dual-loop daylighting sensors with two-way active infrared (IR) communications can provide switching, bi-level, tri-level or dimming control for daylight harvesting.

   5. Digital Room Controllers – Self-configuring, digitally addressable one, two or three relay plenum-rated controllers for on/off control. Selected models include 0-10 volt or line voltage forward phase control dimming outputs and integral current monitoring capabilities.

   6. Digital Plug-Load Controllers – Self-configuring, digitally addressable, single relay, plenum-rated application-specific controllers. Selected models include integral current monitoring capabilities.

   7. Configuration Tools – Handheld remote for room configuration and relay panel programming provides two way infrared (IR) communications to digital devices and allows complete configuration and reconfiguration of the device / room from up to 30 feet away. Unit to have Organic LED display, simple pushbutton interface, and allow bi-directional communication of room variables and occupancy sensor settings. Computer software also customizes room settings.

   8. Digital Lighting Management (DLM) local network – Free topology, plug-in wiring system (Cat 5e) for power and data to room devices.

   9. Digital Lighting Management (DLM) segment network – Linear topology, BACnet MS/TP network (1.5 twisted pair, shielded,) to connect multiple DLM local networks for centralized control

   10. Network Bridge – provides BACnet MS/TP-compliant digital networked communication between rooms, panels and the Segment Manager or building automation system (BAS) and automatically creates BACnet objects representative of connected devices.

11. Segment Manager – provides web browser-based user interface for system control, scheduling, power monitoring, room device parameter administration and reporting.

12. Programming and Configuration software – Optional PC-native application capable of accessing DLM control parameters within a room, for the local network, via a USB adapter, or globally, for many segment networks simultaneously, via BACnet/IP communication.

13. LMCP Digital Lighting Management Relay Panel – provides up to 8, 24, or 48 mechanically latching relays. Relays include a manual override and a single push-on connector for easy installation or removal from the panel. Panel accepts program changes from handheld configuration tool for date and time, location, holidays, event scheduling, button binding and group programming. Provides BACnet MS/TP-compliant digital networked communication between other lighting controls and/or building automation system (BAS).

14. Emergency Lighting Control Unit (ELCU) – allows a standard lighting control device to control emergency lighting in conjunction with normal lighting in any area within a building

2.3 LIGHTING CONTROL APPLICATIONS

A. Unless relevant provisions of the applicable local Energy Codes are more stringent, provide a minimum application of lighting controls as follows:

1. Space Control Requirements – Provide occupancy/vacancy sensors with Manual- or Partial-ON functionality in all spaces except toilet rooms, storerooms, library stacks, or other applications where hands-free operation is desirable and Automatic-ON occupancy sensors are more appropriate. Provide Manual-ON occupancy/vacancy sensors for any enclosed office, conference room, meeting room, open plan system and training room. For spaces with multiple occupants, or where line-of-sight may be obscured, provide ceiling- or corner-mounted sensors and Manual-ON switches.

2. Bi-Level Lighting – Provide multi-level controls in all spaces except toilet rooms, storerooms, library stacks, or applications where variable dimming is used.

3. Task Lighting / Plug Loads – Provide automatic shut off of non essential plug loads and task lighting in all spaces except toilet rooms and storerooms. Provide Automatic-ON of plug loads whenever spaces are occupied. For spaces with multiple occupants a single shut off consistent with the overhead lighting may be used for the area.

4. Daylit Areas – Provide daylight-responsive automatic control in all spaces (conditioned or unconditioned) where daylight contribution is available as defined by relevant local building energy code:

    a. All luminaires within code-defined daylight zones shall be controlled separately from luminaires outside of daylit zones.

    b. Daytime setpoints for total ambient illumination (combined daylight and electric light) levels that initiate dimming shall be programmed in compliance with relevant local building energy codes.

    c. Multiple-leveled switched daylight harvesting controls may be utilized for areas marked on drawings.

d. Provide smooth and continuous daylight dimming for areas marked on drawings. Daylighting control system may be designed to turn off electric lighting when daylight is at or above required lighting levels, only if system functions to turn lamps back on at dimmed level, rather than turning full-on prior to dimming.

5. Conference, meeting, training, auditoriums, and multipurpose rooms shall have controls that allow for independent control of each local control zone. Rooms larger than 300 square feet shall instead have at least four (4) pre-set lighting scenes unless otherwise specified. Occupancy / vacancy sensors shall be provided to extinguish all lighting in the space. Spaces with up to four moveable walls shall include controls that can be reconfigured when the room is partitioned.

2.4 SUBMITTALS

A. Submittals Package: Submit the shop drawings, and the product data specified below at the same time as a package.

B. Shop Drawings:

1. Composite wiring and/or schematic diagram of each control circuit as proposed to be installed.

2. Show exact location of all digital devices, including at minimum sensors, room controllers, and switches for each area on reflected ceiling plans. (Contractor must provide AutoCAD format reflected ceiling plans.)

3. Provide room/area details including products and sequence of operation for each room or area. Illustrate typical acceptable room/area connection topologies.

4. Network riser diagram including floor and building level details. Include network cable specification and end-of-line termination details, if required. Illustrate points of connection to integrated systems. Coordinate integration with mechanical and/or other trades.

C. Product Data: Catalog sheets, specifications and installation instructions.

D. Include data for each device which:

1. Indicates where sensor is proposed to be installed.

2. Prove that the sensor is suitable for the proposed application.

2.5 PROJECT CONDITIONS

A. Do not install equipment until following conditions can be maintained in spaces to receive equipment:

1. Ambient temperature: 0° to 40° C (32° to 104° F).

2. Relative humidity: Maximum 90 percent, non-condensing.

2.6 WARRANTY

A. Provide a five year limited manufacturer’s warranty on all room control devices and panels.

PART 3 – PRODUCTS

3.1 MANUFACTURERS

A. Acceptable Manufacturer:

1. WattStopper

a. System: Digital Lighting Management (DLM)

2. Basis of design product: WattStopper Digital Lighting Management (DLM) or subject to compliance and prior approval with specified requirements of this section, one of the following:

a. <Insert manufacturer's name>

B. Substitutions: [If Permitted]

2. All proposed substitutions (clearly delineated as such) must be submitted in writing for approval by the design professional a minimum of 10 working days prior to the bid date and must be made available to all bidders. Proposed substitutes must be accompanied by a review of the specification noting compliance on a line-by-line basis.

3. By using pre-approved substitutions, the contractor accepts responsibility and associated costs for all required modifications to circuitry, devices, and wiring. The contractor shall provide complete engineered shop drawings (including power and control wiring) with deviations from the original design highlighted for review and approval prior to rough-in.

3.2 DIGITAL LIGHTING CONTROLS

A. Furnish the Company's system which accommodates the square-footage coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors, switches, daylighting sensors and accessories which suit the lighting and electrical system parameters.

3.3 DIGITAL WALL SWITCH OCCUPANCY SENSORS

A. Wallbox mounted passive infrared PIR or dual technology (passive infrared and ultrasonic) digital occupancy sensor with 1 or 2 switch buttons.

B. Digital Occupancy Sensors shall provide scrolling LCD display for digital calibration and electronic documentation. Features include the following:

1. Digital calibration and pushbutton configuration for the following variables:

a. Sensitivity – 0-100% in 10% increments

b. Time delay – 1-30 minutes in 1 minute increments

c. Test mode – Five second time delay

d. Detection technology – PIR, Dual Technology activation and/or re-activation.

e. Walk-through mode

f. Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network.

2. Programmable control functionality including:
   a. Each sensor may be programmed to control specific loads within a local network.
   b. Sensor shall be capable of activating one of 16 user-definable lighting scenes.
   c. Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically during the configurable period of time (default 10 seconds) after turning off.
   d. On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The retrigger mode can be programmed to use the following technologies:
      i Ultrasonic and Passive Infrared
      ii Ultrasonic or Passive Infrared
      iii Ultrasonic only
      iv Passive Infrared only
3. Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both Normal (NH) and After Hour (AH) time periods.
4. Two RJ-45 ports for connection to DLM local network.
5. Two-way infrared (IR) transceiver to allow remote programming through handheld configuration tool and control by remote personal controls.
6. Device Status LEDs including:
   a. PIR detection
   b. Ultrasonic detection
   c. Configuration mode
   d. Load binding
7. Assignment of occupancy sensor to a specific load within the room without wiring or special tools.
8. Assignment of local buttons to specific loads within the room without wiring or special tools
9. Manual override of controlled loads.
10. All digital parameter data programmed into an individual wall switch sensor shall be retained in non-volatile FLASH memory within the wall switch sensor itself. Memory shall have an expected life of no less than 10 years.

C. BACnet object information shall be available for the following objects:

1. Detection state

2. Occupancy sensor time delay
3. Occupancy sensor sensitivity, PIR and Ultrasonic
4. Button state
5. Switch lock control
6. Switch lock status

D. Units shall not have any dip switches or potentiometers for field settings.

E. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required.

F. Two-button wall switch occupancy sensors, when connected to a single relay dimming room controller, shall operate in the following sequence as a factory default:

1. Left button
    a. Press and release - Turn load on
    b. Press and hold - Raise dimming load
2. Right button
    a. Press and release - Turn load off
    b. Press and hold - Lower dimming load

G. Low voltage momentary pushbuttons shall include the following features:

1. Load/Scene Status LED on each switch button with the following characteristics:
    a. Bi-level LED
    b. Dim locator level indicates power to switch
    c. Bright status level indicates that load or scene is active
2. The following button attributes may be changed or selected using a wireless configuration tool:
    a. Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).
    b. Individual button function may be configured to Toggle, On only or Off only.
    c. Individual scenes may be locked to prevent unauthorized change.
    d. Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours.
    e. Ramp rate may be adjusted for each dimmer switch.
    f. Switch buttons may be bound to any load on a room controller and are not load type dependent; each button may be bound to multiple loads.

H. WattStopper part numbers: LMPW, LMDW. Available in white, light almond, ivory, grey, red and black; compatible with wall plates with decorator opening.

5.4 DIGITAL WALL OR CEILING MOUNTED OCCUPANCY SENSOR

A. Wall or ceiling mounted (to suit installation) passive infrared (PIR), ultrasonic or dual technology digital (passive infrared and ultrasonic) occupancy sensor.

B. Digital Occupancy Sensors shall provide graphic LCD display for digital calibration and electronic documentation. Features include the following:

1. Digital calibration and pushbutton configuration for the following variables:
    a. Sensitivity – 0-100% in 10% increments
    b. Time delay – 1-30 minutes in 1 minute increments
    c. Test mode – Five second time delay
    d. Detection technology – PIR, Ultrasonic or Dual Technology activation and/or re-activation.
    e. Walk-through mode
    f. Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network.

2. Programmable control functionality including:
    a. Each sensor may be programmed to control specific loads within a local network.
    b. Sensor shall be capable of activating one of 16 user-definable lighting scenes.
    c. Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically within a configurable period of time (default 10 seconds) after turning off.
    d. On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The retrigger mode can be programmed to use the following technologies:
        i Ultrasonic and Passive Infrared
        ii Ultrasonic or Passive Infrared
        iii Ultrasonic only
        iv Passive Infrared only

3. Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both Normal (NH) and After Hour (AH) time periods.

4. One or two RJ-45 port(s) for connection to DLM local network.

5. Two-way infrared (IR) transceiver to allow remote programming through handheld commissioning tool and control by remote personal controls.

6. Device Status LEDs, which may be disabled for selected applications, including:
    a. PIR detection
    b. Ultrasonic detection
    c. Configuration mode

d. Load binding

7. Assignment of occupancy sensor to a specific load within the room without wiring or special tools.
8. Manual override of controlled loads.
9. All digital parameter data programmed into an individual occupancy sensor shall be retained in non-volatile FLASH memory within the sensor itself. Memory shall have an expected life of no less than 10 years.

C. BACnet object information shall be available for the following objects:
   1. Detection state
   2. Occupancy sensor time delay
   3. Occupancy sensor sensitivity, PIR and Ultrasonic

D. Units shall not have any dip switches or potentiometers for field settings.

E. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required.

F. WattStopper product numbers: LMPX, LMDX, LMPC, LMUC, LMDC

6.5 DIGITAL WALL SWITCHES

A. Low voltage momentary pushbutton switches in 1, 2, 3, 4, 5 and 8 button configuration. Wall switches shall include the following features:
   1. Two-way infrared (IR) transceiver for use with personal and configuration remote controls.
   2. Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.
   3. Configuration LED on each switch that blinks to indicate data transmission.
   4. Load/Scene Status LED on each switch button with the following characteristics:
      a. Bi-level LED
      b. Dim locator level indicates power to switch
      c. Bright status level indicates that load or scene is active
   5. Dimming switches shall include seven bi-level LEDs to indicate load levels using 14 steps.
   6. Programmable control functionality including:
      a. Button priority may be configured to any BACnet priority level, from 1-16, corresponding to networked operation allowing local actions to utilize life safety priority
      b. Scene patterns may be saved to any button other than dimming rockers. Once set, buttons may be digitally locked to prevent overwriting of the preset levels.

7. All digital parameter data programmed into an individual wall switch shall be retained in non-volatile FLASH memory within the wall switch itself. Memory shall have an expected life of no less than 10 years.

B. BACnet object information shall be available for the following objects:

1. Button state
2. Switch lock control
3. Switch lock status

C. Two RJ-45 ports for connection to DLM local network.

D. Multiple digital wall switches may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration shall be required to achieve multi-way switching.

E. The following switch attributes may be changed or selected using a wireless configuration tool:

1. Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).
2. Individual button function may be configured to Toggle, On only or Off only.
3. Individual scenes may be locked to prevent unauthorized change.
4. Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours.
5. Ramp rate may be adjusted for each dimmer switch.
6. Switch buttons may be bound to any load on a room controller and are not load type dependant; each button may be bound to multiple loads.

F. WattStopper product numbers: LMSW-101, LMSW-102, LMSW-103, LMSW-104, LMSW-105, LMSW-108, LMDM-101. Available in white, light almond, ivory, grey, red and black; compatible with wall plates with decorator opening.

6.6 HANDHELD REMOTE CONTROLS

A. Battery-operated handheld devices in 1, 2 and 5 button configurations for remote switching or dimming control. Remote controls shall include the following features:

1. Two-way infrared (IR) transceiver for line of sight communication with DLM local network within up to 30 feet.
2. LED on each button confirms button press.
3. Load buttons may be bound to any load on a room controller and are not load type dependant; each button may be bound to multiple loads.
4. Inactivity timeout to save battery life.

B. A wall mount holster and mounting hardware shall be included with each remote control

C. WattStopper part numbers: LMRH-101, LMRH-102, LMRH-105.

6.7 DIGITAL PARTITION CONTROLS

A. Partition controls shall enable manual or automatic coordination of lighting controls in flexible spaces with up to four moveable walls by reconfiguring the connected digital switches and occupancy sensors.

B. Four-button low voltage pushbutton switch for manual control.

1. Two-way infrared (IR) transceiver for use with configuration remote control.

2. Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.

3. Configuration LED on each switch that blinks to indicate data transmission.

4. Each button represents one wall; Green button LED indicates status.

5. Two RJ-45 ports for connection to DLM local network.

6. WattStopper part number: LMPS-104. Available in white, light almond, ivory, grey and black; compatible with wall plates with decorator opening.

C. Contact closure interface for automatic control via input from limit switches on movable walls (by others).

1. Operates on Class 2 power supplied by DLM local network.

2. Includes 24VDC output and four input terminals for maintained third party contract closure inputs.

a. Input max. sink/source current: 1-5mA

b. Logic input signal voltage High: >18VDC

c. Logic input signal voltage Low: <2VDC

3. Four status LEDs under hinged cover indicate if walls are open or closed; supports LMPS-104 as remote status indicator.

4. Two RJ-45 ports for connection to DLM local network.

5. WattStopper part number: LMIO-102

6.8 DIGITAL DAYLIGHTING SENSORS

A. Digital daylighting sensors shall work with room controllers to provide automatic switching, bi-level, or tri-level or dimming daylight harvesting capabilities for any load type connected to a room controller. Daylighting sensors shall be interchangeable without the need for rewiring.

1. Closed loop sensors measure the ambient light in the space and control a single lighting zone.

2. Open loop sensors measure incoming daylight in the space, and are capable of controlling up to three lighting zones.

3. Dual loop sensors measure both ambient and incoming daylight in the space to insure that proper light levels are maintained as changes to reflective materials are made in a single zone.

B. Digital daylighting sensors shall include the following features:

1. The sensor's internal photodiode shall only measure lightwaves within the visible spectrum. The photodiode's spectral response curve shall closely match the entire photopic curve. The photodiode shall not measure energy in either the ultraviolet or infrared spectrums. The photocell shall have a sensitivity of less than 5% for any wavelengths less than 400 nanometers or greater than 700 nanometers.
2. Sensor light level range shall be from 1-6,553 footcandles (fc).
3. The capability of ON/OFF, bi-level or tri-level switching, or dimming, for each controlled zone, depending on the selection of room controller(s) and load binding to room controller(s).
4. For switching daylight harvesting, the photosensor shall provide a field-selectable deadband, or a separation, between the "ON Setpoint" and the "OFF Setpoint" that will prevent the lights from cycling excessively after they turn off.
5. For dimming daylight harvesting, the photosensor shall provide the option, when the daylight contribution is sufficient, of turning lights off or dimming lights to a field-selectable minimum level.
6. Photosensors shall have a digital, independently configurable fade rate for both increasing and decreasing light level in units of percent per second.
7. Photosensors shall provide adjustable cut-off time. Cut-off time is defined by the number of selected minutes the load is at the minimum output before the load turns off. Selectable range between 0-240 minutes including option to never cut-off.
8. Optional wall switch override shall allow occupants to reduce lighting level to increase energy savings or, if permitted by system administrator, raise lighting levels for a selectable period of time or cycle of occupancy.
9. Integral infrared (IR) transceiver for configuration and/or commissioning with a handheld configuration tool, to transmit detected light level to wireless configuration tool, and for communication with personal remote controls.
10. Configuration LED status light on device that blinks to indicate data transmission.
11. Status LED indicates test mode, override mode and load binding.
12. Recessed switch on device to turn controlled load(s) ON and OFF.
13. BACnet object information shall be available for the following daylighting sensor objects, based on the specific photocell's settings:
    a. Light level
    b. Day and night setpoints
    c. Off time delay
    d. On and off setpoints
    e. Up to three zone setpoints
    f. Operating mode – on/off, bi-level, tri-level or dimming
14. One RJ-45 port for connection to DLM local network.
15. A choice of accessories to accommodate multiple mounting methods and building materials. The photosensors may be mounted on a ceiling tile, skylight light well, suspended lighting fixture or backbox. Standard tube photosensors accommodate mounting materials from 0-0.62" thickness (LMLS-400, LMLS-500). Extended tube photosensors accommodate mounting materials from 0.62"-1.25" thickness (LMLS-400-L, LMLS-500-L). Mounting brackets are compatible with J boxes (LMLS-MB1) and wall mounting (LMLS-MB2). LMLS-600 photosensor to be mounted on included bracket below skylight well.

16. Any load or group of loads in the room can be assigned to a daylighting zone
17. Each load within a daylighting zone can be individually enabled or disabled for discrete control (load independence).
18. All digital parameter data programmed into a photosensor shall be retained in non-volatile FLASH memory within the photosensor itself. Memory shall have an expected life of no less than 10 years.

E. Closed loop digital photosensors shall include the following additional features:

1. An internal photodiode that measures light in a 100-degree angle, cutting off the unwanted light from bright sources outside of this cone.
2. Automatic self-calibration, initiated from the photosensor, a wireless configuration tool or a PC with appropriate software.
3. Automatically establishes application-specific setpoints following self-calibration. For switching operation, an adequate deadband between the ON and OFF setpoints shall prevent the lights from cycling; for dimming operation a sliding setpoint control algorithm with separate Day and Night setpoints shall prevent abrupt ramping of loads.
4. WattStopper Product Number: LMLS-400, LMLS-400-L.

F. Open loop digital photosensors shall include the following additional features:

1. An internal photodiode that measures light in a 60-degree angle cutting off the unwanted light from the interior of the room.
2. Automatically establishes application-specific setpoints following manual calibration using a wireless configuration tool or a PC with appropriate software. For switching operation, an adequate deadband between the ON and OFF setpoints for each zone shall prevent the lights from cycling; for dimming operation, a proportional control algorithm shall maintain the design lighting level in each zone.
3. Each of the three discrete daylight zones can include any non overlapping group of loads in the room.
4. WattStopper Product Number: LMLS-500, LMLS-500-L.

D. Dual loop digital photosensors shall include the following additional features:

1. Close loop portion of dual loop device must have an internal photodiode that measures light in a 100 degree angle, cutting off the unwanted light from sources outside of this con
2. Open loop portion of dual loop device must have an internal photodiode that can measure light in a 60 degree angle, cutting off the unwanted light from the interior of the room.
3. Automatically establishes application-specific set-points following self-calibration. For switching operation, an adequate deadband between the ON and OFF setpoints shall prevent the lights from cycling; for dimming operation a sliding setpoint control algorithm with separate Day and Night setpoints shall prevent abrupt ramping of load.
4. Device must reference closed loop photosensor information as a base line reference. The device must be able to analyze the open loop photosensor information to determine if an adjustment in light levels is required.
5. Device must be able to automatically commission setpoints each night to provide adjustments to electrical lighting based on changes in overall lighting in the space

due to changes in reflectance within the space or changes to daylight contribution based on seasonal changes.

6. Device must include extendable mounting arm to properly position sensor within a skylight well.

7. WattStopper product number LMLS-600

6.14 DIGITAL ROOM CONTROLLERS AND PLUG-LOAD CONTROLLERS

A. Digital controllers for lighting and plug loads automatically bind the room loads to the connected devices in the space without commissioning or the use of any tools. Room and plug load controllers shall be provided to match the room lighting and plug load control requirements. The controllers will be simple to install, and will not have dip switches or potentiometers, or require special configuration for standard Plug n' Go applications. The control units will include the following features:

1. Automatic room configuration to the most energy-efficient sequence of operation based upon the devices in the room.

2. Simple replacement – Using the default automatic configuration capabilities, a room controller may be replaced with an off-the-shelf.

3. Multiple room controllers connected together in a local network must automatically prioritize each room controller, without requiring any configuration or setup, so that loads are sequentially assigned using room controller device ID's from highest to lowest.

4. Device Status LEDs to indicate:
    a. Data transmission
    b. Device has power
    c. Status for each load
    d. Configuration status

5. Quick installation features including:
    a. Standard junction box mounting
    b. Quick low voltage connections using standard RJ-45 patch cable

6. Based on individual configuration, each load shall be capable of the following behavior on power up following the loss of normal power:
    a. Turn on to 100%
    b. Remain off
    c. Turn on to last level

7. Each load shall be configurable to operate in the following sequences based on occupancy:
    a. Auto-on/Auto-off (Follow on and off)
    b. Manual-on/Auto-off (Follow off only)

8. The polarity of each load output shall be reversible, via digital configuration, so that on is off and off is on.

9. BACnet object information shall be available for the following objects:

a. Load status
b. Electrical current
c. Total watts per controller
d. Schedule state – normal or after-hours
e. Demand response control and cap level
f. Room occupancy status
g. Total room lighting and plug loads watts
h. Total room watts/sq ft
i. Force on/off all loads

14. UL 2043 plenum rated
15. Manual override and LED indication for each load
16. Dual voltage (120/277 VAC, 60 Hz), or 347 VAC, 60 Hz (selected models only). 120/277 volt models rated for 20A total load, derating to 16A required for some dimmed loads (forward phase dimming); 347 volt models rated for 15A total load; plug load controllers carry application-specific UL 20 rating for receptacle control.
17. Zero cross circuitry for each load
18. All digital parameter data programmed into an individual room controller or plug load controller shall be retained in non-volatile FLASH memory within the controller itself. Memory shall have an expected life of no less than 10 years.

B. On/Off Room Controllers shall include:

1. One or two relay configuration
2. Efficient 150 mA switching power supply
3. Three RJ-45 DLM local network ports with integral strain relief and dust cover
4. WattStopper product numbers: LMRC-101, LMRC-102

C. On/Off/Dimming enhanced Room Controllers shall include:

1. Real time current monitoring
2. Multiple relay configurations

PART 10 – One, two or three relays (LMRC-21x series)
PART 11 – One or two relays (LMRC-22x series)

1. Efficient 250 mA switching power supply
2. Four RJ-45 DLM local network ports with integral strain relief and dust cover
3. One dimming output per relay
    a. 0-10V Dimming - Where indicated, one 0-10 volt analog output per relay for control of compatible ballasts and LED drivers. The 0-10 volt output shall automatically open upon loss of power to the Room Controller to assure full light output from the controlled lighting. (LMRC-21x series)
    b. Line Voltage, Forward Phase Dimming - Where indicated, one forward phase control line voltage dimming output per relay for control of compatible two-wire or three-wire ballasts, LED drivers, MLV, forward phase compatible ELV, neon/cold cathode and incandescent loads. (LMRC-22x series)

c. Each dimming output channel shall have an independently configurable minimum and maximum calibration trim level to set the dimming range to match the true dynamic range of the connected ballast or driver.

d. The LED level indicators on bound dimming switches shall utilize this new maximum and minimum trim.

e. Each dimming output channel shall have an independently configurable minimum and maximum trim level to set the dynamic range of the output within the new 0-100% dimming range defined by the minimum and maximum calibration trim.

f. Calibration and trim levels must be set per output channel.

g. Devices that set calibration or trim levels per controller are not acceptable.

h. All configuration shall be digital. Devices that set calibration or trim levels per output channel via trim pots or dip-switches are not acceptable.

4. Each load shall have an independently configurable preset on level for Normal Hours and After Hours events to allow different dimmed levels to be established at the start of both Normal Hours and After Hours events.
5. Fade rates for dimming loads shall be specific to bound switch buttons, and the load shall maintain a default value for any bound buttons that do not specify a unique value.
6. The following dimming attributes may be changed or selected using a wireless configuration tool:
    a. Establish preset level for each load from 0-100%
    b. Set high and low trim for each load
    c. Set lamp burn in time for each load up to 100 hours
7. Override button for each load provides the following functions:
    a. Press and release for on/off control
    b. Press and hold for dimming control
8. WattStopper product numbers: LMRC-211, LRMC-212, LRMC-213, LMRC-221, LMRC-222

B. Plug Load Room Controllers shall include:

1. One relay configuration with additional connection for unswitched load
2. Configurable additive time delay to extend plug load time delay beyond occupancy sensor time delay (e.g. a 10 minute additive delay in a space with a 20 minute occupancy sensor delay ensures that plug loads turn off 30 minutes after the space is vacated).
3. Factory default operation is Auto-on/Auto-off, based on occupancy
4. Real time current monitoring of both switched and un-switched load (LMPL-201 only)
5. Efficient switching power supply
    a. 150mA (LMPL-101)
    b. 250mA (LMPL-201)
6. RJ-45 DLM local network ports
    a. Three RJ-45 ports (LMPL-101)

b. Four RJ-45 ports (LMPL-201)

7. WattStopper product numbers: LMPL-101, LMPL-201.

12.10 DLM LOCAL NETWORK (Room Network)

A. The DLM local network is a free topology lighting control physical connection and communication protocol designed to control a small area of a building.

B. Features of the DLM local network include:

1. Plug n' Go® automatic configuration and binding of occupancy sensors, switches and lighting loads to the most energy-efficient sequence of operation based upon the device attached.

2. Simple replacement of any device in the network with a standard off the shelf unit without requiring commissioning, configuration or setup.

3. Push n' Learn® configuration to change the automatic configuration, including binding and load parameters without tools, using only the buttons on the digital devices in the local network.

4. Two-way infrared communications for control by handheld remotes, and configuration by a handheld tool including adjusting load parameters, sensor configuration and binding, within a line of sight of up to 30 feet from a sensor, wall switch or IR receiver.

C. Digital room devices connect to the local network using pre-terminated Cat 5e cables with RJ-45 connectors, which provide both data and power to room devices. Systems that utilize RJ-45 patch cords but do not provide serial communication data from individual end devices are not acceptable.

D. If manufacture's pre-terminated Cat5e cables are not used for the installation, the contractor is responsible for testing each cable following installation and supplying manufacturer with test results.

E. WattStopper Product Number: LMRJ-Series

13.11 DLM SEGMENT NETWORK (Room to Room Network)

A. The segment network shall be a linear topology, BACnet-based MS/TP subnet to connect DLM local networks (rooms) and LMCP relay panels for centralized control.

1. Each connected DLM local network shall include a single network bridge (LMBC-300), and the network bridge is the only room-based device that is connected to the segment network.

2. Network bridges, relay panels and segment managers shall include terminal blocks, with provisions for separate "in" and "out" terminations, for segment network connections.

3. The segment network shall utilize 1.5 twisted pair, shielded, cable supplied by the lighting control manufacturer. The maximum cable run for each segment is 4,000 feet. Conductor-to-conductor capacitance of the twisted pair shall be less than 30 pf/ft and have a characteristic impedance of 120 Ohms.

4. Network signal integrity requires that each conductor and ground wire be correctly terminated at every connected device.
5. Substitution of manufacturer-supplied cable must be pre-approved: Manufacturer will not certify network reliability, and reserves the right to void warranty, if non-approved cable is installed, and if terminations are not completed according to manufacturer's specific requirements.
6. Segment networks shall be capable of connecting to BACnet-compliant BAS (provided by others) either directly, via MS/TP, or through NB-ROUTERs, via BACnet/IP or BACnet/Ethernet. Systems whose room-connected network infrastructure require gateway devices to provide BACnet data to a BAS are unacceptable.

B. WattStopper Product Number: LM-MSTP, LM-MSTP-DB

13.12 CONFIGURATION TOOLS

A. A wireless configuration tool facilitates optional customization of DLM local networks using two-way infrared communications, while PC software connects to each local network via a USB interface.

B. Features and functionality of the wireless configuration tool shall include but not be limited to:

1. Two-way infrared (IR) communication with DLM IR-enabled devices within a range of approximately 30 feet.
2. High visibility organic LED (OLED) display, pushbutton user interface and menu-driven operation.
3. Must be able to read and modify parameters for room controllers, occupancy sensors, wall switches, daylighting sensors, network bridges and relay panels, and identify room devices by type and serial number.
4. Save up to eight occupancy sensor setting profiles, and apply profiles to selected sensors.
5. Temporarily adjust light level of any load(s) on the local network, and incorporate those levels in scene setting. Set room mode for testing of Normal Hours (NH) and After Hours (AH) parameter settings.
6. Adjust or fine-tune daylighting settings established during auto-configuration, and input light level data to complete configuration of open loop daylighting controls.
7. Set room mode for testing of Normal Hours (NH) and After Hours (AH) parameter settings.
8. Verify status of building level network devices.

C. WattStopper Product Numbers: LMCT-100, LMCI-100/LMCS-100

13.13 NETWORK BRIDGE

A. The network bridge module connects a DLM local network to a BACnet-compliant segment network for communication between rooms, relay panels and a segment manager or BAS. Each local network shall include a network bridge component to provide a connection to the local network room devices. The network bridge shall use industry standard BACnet MS/TP network communication and an optically isolated EIA/TIA RS-485 transceiver.

1. The network bridge shall be provided as a separate module connected on the local network through an available RJ-45 port.

2. Provide Plug n' Go operation to automatically discover room devices connected to the local network and make all device parameters visible to the segment manager via the segment network. No commissioning shall be required for set up of the network bridge on the local network.

3. The network bridge shall automatically create standard BACnet objects for selected room device parameters to allow any BACnet-compliant BAS to include lighting control and power monitoring features as provided by the DLM room devices on each local network. BACnet objects will be created for the addition or replacement of any given in-room DLM device for the installed life of the system. Products requiring that an application-specific point database be loaded to create or map BACnet objects are not acceptable. Systems not capable of providing BACnet data for control devices via a dedicated BACnet Device ID and physical MS/TP termination per room are not acceptable. Standard BACnet objects shall be provided as follows:
    a. Read/write the normal or after hours schedule state for the room
    b. Read the detection state of each occupancy sensor
    c. Read the aggregate occupancy state of the room
    d. Read/write the On/Off state of loads
    e. Read/write the dimmed light level of loads
    f. Read the button states of switches
    g. Read total current in amps, and total power in watts through the room controller
    h. Read/write occupancy sensor time delay, PIR sensitivity and ultrasonic sensitivity settings
    i. Activate a preset scene for the room
    j. Read/write daylight sensor fade time and day and night setpoints
    k. Read the current light level, in footcandles, from interior and exterior photosensors and photocells
    l. Set daylight sensor operating mode
    m. Read/write wall switch lock status
    n. Read watts per square foot for the entire controlled room
    o. Write maximum light level per load for demand response mode
    p. Read/write activation of demand response mode for the room
    q. Activate/restore demand response mode for the room

B. WattStopper product numbers: LMBC-300

15.13 SEGMENT MANAGER

A. For networked applications, the Digital Lighting Management system shall include at least one segment manager to manage network communication. It shall be capable of serving up a graphical user interface via a standard web browser utilizing either unencrypted TCP/IP traffic via a configurable port (default is 80) or 256 bit AES encrypted SSL TCP/IP traffic via a configurable port (default is 443).

B. Each segment manager shall have integral support for at least three segment networks. Segment networks may alternately be connected to the segment manger via external routers and switches, using standard Ethernet structured wiring. Each router shall accommodate one segment network. Provide the quantity of routers and switches as shown on the plans.

C. Operational features of the Segment Manager shall include the following:

1. Connection to PC or LAN via standard Ethernet TCP/IP via standard Ethernet TCP/IP with the option to use SSL encrypted connections for all traffic.

2. Easy to learn and use graphical user interface, compatible with Internet Explorer 8, or equal browser. Shall not require installation of any lighting control software to an end-user PC.

3. Log in security capable of restricting some users to view-only or other limited operations.

4. Automatic discovery of DLM devices and relay panels on the segment network(s). Commissioning beyond activation of the discovery function shall not be required to provide communication, monitoring or control of all local networks and lighting control panels.

5. After discovery, all rooms and panels shall be presented in a standard navigation tree format. Selecting a device from the tree will allow the device settings and operational parameters to be viewed and changed by the user.

6. Ability to view and modify room device operational parameters. It shall be possible to set device parameters independently for normal hours and after hours operation including sensor time delays and sensitivities, and load response to sensor including Manual-On or Auto-On.

7. Ability to set up schedules for rooms and panels, view and override current status of panel channels and relays, and assign relays to groups. Schedules shall automatically set controlled zones or areas to either a normal hours or after hours mode of operation. Support for a minimum of 100 unique schedules, each with up to four time events per day. Support for annual schedules, holiday schedules and unique date-bound schedules.

8. Ability to group rooms and loads for common control by schedules, switches or network commands.

9. Ability to monitor connected load current and display power consumption for areas equipped with room controllers incorporating the integral current monitoring feature.

10. Provide capabilities for integration with a BAS via BACnet protocol. At a minimum, the following points shall be available to the BAS via BACnet IP connection to the segment manager: room occupancy state; room schedule mode; room switch lock control; individual occupancy sensor state; room lighting power; room plug-load power; load ON/OFF state; load dimming level; panel channel schedule state; panel relay state; and Segment Manager Group schedule state control.

11. The Segment Manager shall allow access and control of the overall system database via Native Niagara AX FOX connectivity. Systems that must utilize a Tridium Niagara controller in addition to the programming, scheduling and configuration server are not acceptable.

C. Segment Manager shall support multiple DLM rooms as follows:

1. Support up to 120 network bridges and 900 digital in-room devices (LMSM-3E).

2. Support up to 300 network bridges and 2,200 digital in room devices, connected via network routers and switches (LMSM-6E).

E. WattStopper Product Numbers: LMSM-3E, LMSM-6E, NB-ROUTER, NB-SWITCH, NB-SWITCH-8, NB-SWITCH-16.

17.14 PROGRAMMING, CONFIGURATION AND DOCUMENTATION SOFTWARE

A. PC-native application for optional programming of detailed technician-level parameter information for all DLM products, including all parameters not accessible via BACnet and the handled IR configuration tool. Software must be capable of accessing room-level parameter information locally within the room when connected via the optional LMCI-100 USB programming adapter, or globally for many segment networks simultaneously utilizing standard BACnet/IP communication.

1. Additional parameters exposed through this method include but are not limited to:

a. Occupancy sensor detection LED disable for performance and other aesthetic spaces where blinking LEDs present a distraction.

b. Six occupancy sensor action behaviors for each controlled load, separately configurable for normal hours and after hours modes. Modes include: No Action, Follow Off Only, Follow On Only, Follow On and Off, Follow On Only with Override Time Delay, Follow Off Only with Blink Warn Grace Time, Follow On and Off with Blink Warn Grace Time.

c. Separate fade time adjustments per load for both normal and after hours from 0 - 4 hours.

d. Configurable occupancy sensor re-trigger grace period from 0 - 4 minutes separate for both normal hours and after hours.

e. Separate normal hours and after hours per-load button mode with modes including: Do nothing, on only, off only, on and off.

f. Load control polarity reversal so that on events turn loads off and vice versa.

g. Per-load DR (demand response) shed level in units of percent.

h. Load output pulse mode in increments of 1second.

i. Fade trip point for each load for normal hours and after hours that establishes the dimmer command level at which a switched load closes its relay to allow for staggered On of switched loads in response to a dimmer.

2. Generation of reports at the whole file, partial file, or room level. Reports include but are not limited to:

a. Device list report: All devices in a project listed by type.

b. Load binding report: All load controller bindings showing interaction with sensors, switches, and daylighting.

c. BACnet points report: Per room Device ID report of the valid BACnet points for a given site's BOM.

d. Room summary report: Device manifest for each room, aggregated by common BOM, showing basic sequence of operations.

e. Device parameter report: Per-room lists of all configured parameters accessible via hand held IR programmer for use with O&M documentation.

f. Scene report: All project scene pattern values not left at defaults (i.e. 1 = all loads 100%, 2 = all loads 75%, 3 = all loads 50%, 4 = all loads 25%, 5-16 = same as scene 1).

g. Occupancy sensor report: Basic settings including time delay and sensitivity(ies) for all occupancy sensors.

3. Network-wide programming of parameter data in a spreadsheet-like programming environment including but not limited to the following operations:

   a. Set, copy/paste an entire project site of sensor time delays.

   b. Set, copy/paste an entire project site of sensor sensitivity settings.

   c. Search based on room name and text labels.

   d. Filter by product type (i.e. LMRC-212) to allow parameter set by product.

   e. Filter by parameter value to search for product with specific configurations.

4. Network-wide firmware upgrading remotely via the BACnet/IP network.

   a. Mass firmware update of entire rooms.

   b. Mass firmware update of specifically selected rooms or areas.

   c. Mass firmware upgrade of specific products.

B. WattStopper Product Number: LMCS-100, LMCI-100

17.20 LMCP LIGHTING CONTROL PANELS

A. Provide lighting control panels in the locations and capacities as indicated on the plans and schedules. Each panel shall be of modular construction and consist of the following components:

1. Enclosure/Tub shall be NEMA 1, sized to accept an interior with 1 - 8 relays, 1 - 24 relays and 6 four-pole contactors, or 1 - 48 relays and 6 four-pole contactors.

2. Cover shall be configured for surface or flush wall mounting of the panel as indicated on the plans. The panel cover shall have a hinged and lockable door with restricted access to line voltage section of the panel.

3. Interior assembly shall be supplied as a factory assembled component specifically designed and listed for field installation. The interior construction shall provide total isolation of high voltage (Class 1) wiring from low voltage (Class 2) wiring within the assembled panel. The interior assembly shall include intelligence boards, power supply, DIN rails for mounting optional Class 2 control devices, and individually replaceable latching type relays. The panel interiors shall include the following features:

   a. Removable, plug-in terminal blocks with connections for all low voltage terminations.

b. Individual terminal block, override pushbutton, and LED status light for each relay.

c. Direct wired switch inputs associated with each relay shall support 2-wire momentary switches only.

d. Digital inputs (four RJ-45 jacks) shall support 1-, 2-, 3-, 4-, and 8-button digital switches; digital IO modules capable of receiving 0-5V or 0-10V analog photocell inputs; digital IO modules capable of receiving momentary or maintained contact closure inputs or analog sensor inputs; digital daylighting sensors; and digital occupancy sensors. Inputs are divided into two separate digital networks, each capable of supplying 250mA to connected devices.

e. True relay state shall be indicated by the on-board LED and shall be available to external control devices and systems via BACnet.

f. Automatically sequenced operation of relays to reduce impact on the electrical distribution system when large loads are controlled simultaneously.

g. Group and pattern control of relays shall be provided through a simple keypad interface from a handheld IR programmer. Any set of relays can be associated with a group for direct on/off control or pattern (scene) control via a simple programming sequence using the relay override pushbuttons and LED displays for groups 1-8 or a handheld IR programmer for groups 1-99.

h. Relay group status for shall be provided through LED indicators for groups 1-8 and via BACnet for groups 1-99. A solid LED indicates that the last group action called for an ON state and relays in the group are on or in a mixed state.

i. Single-pole latching relays with modular plug-in design. Relays shall provide the following ratings and features:

PART 18 – Electrical:

i 30 amp ballast at 277V

ii 20 amp ballast at 347V

iii 20amp tungsten at 120V

iv 30 amp resistive at 347V

v 1.5 HP motor at 120V

vi 14,000 amp short circuit current rating (SCCR) at 347V

vii Relays shall be specifically UL 20 listed for control of plug-loads

PART 19 – Mechanical:

i Replaceable, ½" KO mounting with removable Class 2 wire harness.

ii Actuator on relay housing provides manual override and visual status indication, accessible from Class 2 section of panel.

iii Dual line and load terminals each support two #14 - #12 solid or stranded conductors.

iv Tested to 300,000 mechanical on/off cycles.

2. Isolated low voltage contacts provide for true relay status feedback and pilot light indication.
3. Power supply shall be a multi-voltage transformer assembly with rated power to supply all electronics, occupancy sensors, switches, pilot lights, and photocells as necessary to meet the project requirements. Power supply to have internal over-current protection with automatic reset and metal oxide varistor protection.
4. Where indicated, lighting control panels designated for control of emergency lighting shall be provided with factory installed provision for automatic by pass of relays controlling emergency circuits upon loss of normal power. Panels shall be properly listed and labeled for use on emergency lighting circuits and shall meet the requirements of UL924 and NFPA 70 - Article 700.
5. Integral system clock shall provide scheduling capabilities for panel-only projects without DLM segment networks or BAS control.
    a. Each panel shall include digital clock capability able to issue system wide automation commands to up to (11) eleven other panels for a total of (12) twelve networked lighting control panels. The clock shall provide capability for up to 254 independent schedule events per panel for each of the ninety-nine system wide channel groups.
    b. The clock capability of each panel shall support the time-based energy saving requirements of applicable local energy codes.
    c. The clock module shall provide astronomic capabilities, time delays, blink warning, daylight savings, and holiday functions and will include a battery back up for the clock function and program retention in non-volatile FLASH memory. Clocks that require multiple events to meet local code lighting shut off requirements shall not be allowed.
    d. The clock capability of each panel shall operate on a basis of ON/OFF or Normal Hours/After Hours messages to automation groups that implement pre-configured control scenarios. Scenarios shall include:
        i Scheduled ON / OFF
        ii Manual ON / Scheduled OFF
        iii Astro ON / OFF (or Photo ON / OFF)
        iv Astro and Schedule ON / OFF (or Photo and Schedule ON / OFF)
    e. The user interface shall be a portable IR handheld remote control capable of programming any panel in the system (LMCT-100)
    f. The clock capability of each panel shall employ non-volatile memory and shall retain user programming and time for a minimum of 10 years.
    g. Schedules programmed into the clock of any one panel shall be capable of executing panel local schedule or Dark/Light (photocell or Astro) events for that panel in the event that global network communication is lost. Lighting control panels that are not capable of executing events independently of the global network shall not be acceptable.
6. The lighting control panel can operate as a stand-alone system, or can support schedule, group, and photocell control functions, as configured in a Segment Manager controller, via a segment network connection.

7. The lighting control panel shall support digital communications to facilitate the extension of control to include interoperation with building automation systems and other intelligent field devices. Digital communications shall be RS485 MS/TP-based using the BACnet® protocol.
    a. The panel shall have provision for an individual BACnet device ID and shall support the full 2^{22} range (0 – 4,193,304). The device ID description property shall be writable via the network to allow unique identification of the lighting control panel on the network.
    b. The panel shall support MS/TP MAC addresses in the range of 0 – 127 and baud rates of 9600k, 38400k, 76800k, and 115.2k bits per second.
    c. Lighting control relays shall be controllable as binary output objects in the instance range of 1 – 64. The state of each relay shall be readable and writable by the BAS via the object present value property.
    d. Lighting control relays shall report their true on/off state as binary input objects in the instance range of 1 – 64.
    e. The 99 group Normal Hours/After Hours control objects associated with the panel shall be represented by binary value objects in the instance range of 201 – 299. The occupancy state of each channel group shall be readable and writable by the BAS via the object present value property. Commanding 1 to a channel group will put all relays associated with the channel into the normal hours mode. Commanding 0 or NULL shall put the relays into the after hours mode.
    f. Setup and commissioning of the panel shall not require manufacturer-specific software or a computer. All configuration of the lighting control panel shall be performed using standard BACnet objects or via the handheld IR programming remote. Provide BACnet objects for panel setup and control as follows:
        i Binary output objects in the instance range of 1 – 64 (one per relay) for on/off control of relays.
        ii Binary value objects in the instance range of 1 – 99 (one per channel) for normal hours/after hours schedule control.
        iii Binary input objects in the instance range of 1 – 64 (one per relay) for reading true on/off state of the relays.
        iv Analog value objects in the instance range of 101 – 199 (one per channel group) shall assign a blink warn time value to each channel. A value of 5 shall activate the blink warn feature for the channel and set a 5-minute grace-time period. A value of 250 shall activate the sweep feature for the channel and enable the use of sweep type automatic wall switches.
    g. The description property for all objects shall be writable via the network and shall be saved in non-volatile memory within the panel.
    h. The BO and BV 1 – 99 objects shall support BACnet priority array with a relinquish default of off and after hours respectively. Prioritized writes to the channel BV objects shall propagate prioritized control to each member relay in a way analogous to the BACnet Channel object described in addendum aa. (http://www.bacnet.org/Addenda/Add-135-2010aa.pdf)
    i. Panel-aggregate control of relay Force Off at priority 2 shall be available via a single BV5 object. Force On at priority 1 shall be available via a single BV4 object.
    j. Lockout of all digital switch buttons connected to a given panel shall be command-able via a single BV2 object. The lock status of any connected switch station shall be represented as BV101-196.

10. WattStopper Product Number: LMCP8, LMCP24 or LMCP48

B. USER INTERFACE

21.16 Each lighting control panel system shall be supplied with at least (1) handheld configuration tool (LMCT-100). As a remote programming interface the configuration tool shall allow setup, configuration, and diagnostics of the panel without the need for software or connection of a computer. The user interface shall have the following panel-specific functions as a minimum:

1. Set network parameters including panel device ID, MS/TP MAC address, baud rate and max master range.
2. Relay Group creation of up to 99 groups. Group creation shall result in programming of all seven key relay parameters for member relays. The seven parameters are as follows: After-hours Override Time Delay, Normal Hours Override Time Delay, Action on Transition to Normal Hours, Action on Transition to After Hours, Sensor Action During Normal Hours, Sensor Action During After Hours, Blink-Warn Time for After Hours.
3. Program up to 254 separate scheduled events. Events shall occur on seven day intervals with each day selectable as active or inactive, and shall be configurable as to whether the event is active on holidays. Holidays are also defined through the User Interface.
4. Program up to 32 separate Dark/Light events. Events shall have a selectable source as either calculated Astro with delay, or a digital IO module with an integral 0-5V or 0-10V analog photocell. Dark/Light events shall occur on seven day intervals with each day selectable as active or inactive, and shall be configurable as to whether the event is active on holidays.
5. Button binding of digital switches to groups shall be accessible via the handheld IR remote and accomplished from the digital switch station.
6. Programming of panel location information shall be accomplished by the handheld IR remote and include at a minimum LAT, LON, DST zone, and an approximate city/state location.
7. An additional handheld IR remote may optionally be specified to be permanently mounted to the panel interior via a retractable anti-theft lanyard to allow for convenient programming of the panel while assuring that the handheld programmer is always present at that panel. An unlimited number of handheld IR remotes may also be purchased for facilities staff as determined by the end user's representative.
8. WattStopper Product Number: LMCT-100

23.16 EMERGENCY LIGHTING CONTROL DEVICES

A. Emergency Lighting Control Unit – A UL 924 listed device that monitors a switched circuit providing normal lighting to an area. The unit provides normal ON/OFF control of emergency lighting along with the normal lighting. Upon normal power failure the emergency lighting circuit will close, forcing the emergency lighting ON until normal power is restored. Features include:

1. 120/277 volts, 50/60 Hz, 20 amp ballast rating
2. Push to test button
3. Auxiliary contact for remote test or fire alarm system interface

B. WattStopper Product Numbers: ELCU-100, ELCU-200.

PART 24 – EXECUTION

24.1 OPTIONAL PRE-INSTALLATION MEETING

A. A factory authorized manufacturer's representative shall provide the electrical contractor a functional overview of the lighting control system prior to installation. The contractor shall schedule the pre-installation site visit after receipt of approved submittals to review the following:

1. Confirm the location and mounting of all digital devices, with special attention to placement of occupancy and daylighting sensors.

2. Review the specifications for low voltage control wiring and termination.

3. Discuss the functionality and configuration of all products, including sequences of operation, per design requirements.

4. Discuss requirements for integration with other trades.

24.2 CONTRACTOR INSTALLATION AND SERVICES

A. Contractor to install all devices and wiring in a professional manner. All line voltage connections to be tagged to indicate circuit and switched legs.

B. Contractor to install all room/area devices using manufacturer's factory-tested Cat 5e cable with pre-terminated RJ-45 connectors. If pre-terminated cable is not used for room/area wiring, the contractor is responsible for testing each field-terminated cable following installation, and shall supply the lighting controls manufacturer with test results. Contractor to install any room to room network devices using manufacturer-supplied LM-MSTP network wire. Network wire substitution is not permitted and may result in loss of product warranty per DLM SEGMENT NETWORK section of specification. Low voltage wiring topology must comply with manufacturer's specifications. Contractor shall route network wiring as shown in submittal drawings as closely as possible, and shall document final wiring location, routing and topology on as built drawings.

C. Install the work of this Section in accordance with manufacturer's printed instructions unless otherwise indicated. Before start up, contractor shall test all devices to ensure proper communication.

D. Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings.

1. Adjust time delay so that controlled area remains lighted while occupied.

E. Provide written or computer-generated documentation on the configuration of the system including room by room description including:

1. Sensor parameters, time delays, sensitivities, and daylighting setpoints.

2. Sequence of operation, (e.g. manual ON, Auto OFF. etc.)

3. Load Parameters (e.g. blink warning, etc.)

F. Post start-up tuning – After 30 days from occupancy contractor shall adjust sensor time delays and sensitivities to meet the Owner's requirements. Provide a detailed report to the Architect / Owner of post start-up activity.

27.3 FACTORY SERVICES

A. Upon completion of the installation, the manufacturer's factory authorized representative shall start up and verify a complete fully functional system.

B. The electrical contractor shall provide both the manufacturer and the electrical engineer with three weeks written notice of the system start up and adjustment date.

C. Upon completion of the system start up, the factory-authorized technician shall provide the proper training to the owner's personnel on the adjustment and maintenance of the system.

29.4 OPTIONAL COMMISSIONING SUPPORT SERVICES

A. On this project, a commissioning agent will be hired to verify the installation and programming of all building systems, which includes the lighting control system. Manufacturer should include an extra day of technician’s time to review the functionality and settings of the lighting control hardware with the commissioning agent, including reviewing submittal drawings and ensuring that instructions on how to configure each device are readily available. Manufacturer is NOT responsible for helping the commissioning agent inspect the individual devices. It will be the commissioning agent’s responsibility to create and complete any forms required for the commissioning process, although the manufacturer or contractor may offer spreadsheets and/or printouts to assist the agent with this task.

B. The commissioning agent shall work with the electrical contractor during installation of the lighting control hardware to become familiar with the specific products. The agent may also accompany the manufacturer’s technicians during their start-up work to better understand the process of testing, calibration and configuration of the products. However, the contractor and manufacturer shall ensure that interfacing with the agent does not prevent them from completing the requirements outlined in the contract documents.

29.5 OPTIONAL ACCEPTANCE TESTING SUPPORT SERVICES

A. On all California projects, a certified lighting controls acceptance test technician (CLCATT) must verify the installation of the lighting control system. Manufacturer should include an extra day of factory technician’s time to assist the CLCATT review the functionality and settings of the lighting control hardware per the requirements in the California State forms. It will be the CLCATT’s responsibility to create and complete any forms required for the commissioning process, although the manufacturer or contractor may offer spreadsheets and/or printouts to assist the CLCATT with this task.

PART 30 – END OF SECTION

SECTION 26 09 50 - LIGHTING CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general conditions, Division 1, and Basic Electrical Requirements (Section 26 05 00) are part of this section and the contract for this work and apply to this section as fully as if repeated herein.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 SCOPE

A. Furnish and install a complete system for the control of lighting and other equipment as indicated on the plans and as further defined herein:

1. The system shall include, but may not be limited by the following list:

a. Pre-wired, microprocessor controlled relay panels with electrically held, electronically latched relays, which are controlled via a complete list of communications based accessories including:

1) Softwire (digital) switches
2) Softwire (digital) photocells
3) Digital Time Clock and interface cards to dimming systems
4) Building automation systems
5) Thermostats
6) Any contact closure or analog based output device.

B. The type of lighting control equipment and wiring specified in this section is covered by the description: Microprocessor Controlled Relay Lighting Control system with RS485 Bus communications.

C. Requirements are indicated elsewhere in these specifications for work including, but not limited to: raceways, electrical boxes and fittings required for installation of control equipment and wiring. They are not the work of this section.

1.3 QUALITY ASSURANCE AND STANDARDS

A. All electrical work shall comply with the latest edition under enforcement, including all amendments, modifications and supplements, of the following codes and standards or other regulations which may apply:

1. American Disabilities Act (ADA)
2. American National Standards Institute (ANSI)
3. American Society for Testing and Materials (ASTM)
4. Institute of Cable Engineers Association (ICEA)
5. Institute of Electrical and Electronic Engineers (IEEE)
6. Local Code Enforcement Agency Requirements
7. National Electrical Code (NEC)

8. National Electrical Contractors Association (NECA)
9. National Electrical Manufacturer's Association (NEMA)
10. National Electrical Testing Association (NETA)
11. National Fire Protection Association (NFPA)
12. Underwriters' Laboratories, Inc. (UL)
13. International Building Code (IBC)

No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. Any conflicts or changes required to the contract documents in order to obtain compliance with applicable codes shall be brought to the immediate attention of the Engineer, Architect, and Owner's Representative by the Contractor.

B. Equipment shown to scale is approximate only and based upon a general class of equipment specified. The Contractor shall verify all dimensions and clearances prior to commencement of work.

C. The Contractor shall verify all points of connection with the manufacturer’s requirements, instructions, or recommendations prior to installation. The actual dimensions, weights, clearance requirements and installation requirements shall be verified and coordinated by the Contractor.

D. Major Components: All major components of the system shall be standard catalog items available through electrical distributors. Control wiring shall be in accordance with the NEC requirements for Class 2 remote control systems, Article 725.

E. System Checkout: A trained electrician shall functionally test each component in the system after installation to verify proper operation and confirm that the panel and switch wiring conform to the wiring documentation. The Electrical Contractor (EC) is required to phone LC&D a minimum of 7 days prior to turn over for system checkout. At time of LC&D contact, all components providing telephone service to the modem must be installed, powered and operational.

F. NEC Compliance: Comply to NEC as applicable to electrical wiring work.

G. NEMA Compliance: Comply with applicable portions of NEMA standards pertaining to types of electrical equipment enclosures.

H. Approvals: Lighting Control panels are to be ETL listed to UL 916.

1.4 SUBMITTALS

A. Product Data: Submit for prior approval, copies of manufacturer's data on the specific lighting control system and components as indicated in Section 26 05 00. Submittal shall be in both electronic and hard copy formats. To prevent departures from approved system operation, electronic file submitted shall be able to be directly downloaded to the specified system.

B. Shop Drawings: Submit dimensioned drawings of lighting control system and accessories including, but not necessarily limited to, relay panels, switches and time clocks and interfaces.

C. One Line Diagram: Submit a one line diagram of the system configuration proposed indicating the type, size and number of conductors between each component. Submittals that show typical riser diagrams are not acceptable.

D. Bill of Materials: Submit a complete bill of materials with part numbers and voltage specifications.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

A. Lighting Control Panels

1. Relay Panel. Panels shall be made up of the following components:

a. NEMA rated enclosure with screw cover or hinged door. Rain tight or oil tight versions shall be available as an option.
b. 16 gauge steel barrier shall separate the high voltage and low voltage compartments of the panel. Additionally, any panels with multiple voltages (e.g.: 120V and 277V) shall have barriers provided to separate each section.
c. Output Relays mounted in "Snap Track" such that they are easy to insert or remove. Relay terminal blocks are to be capable of accepting two (2) #10AWG wires on both the line and the load side. Blocks shall be securely anchored to prevent twisting when tightening down the screws. Systems that do not allow for individual relay replacement or additions shall not be acceptable.
d. Transformer: Primary shall be dual voltage accepting either 277V or 120V without special wiring. Voltage selection shall be by a rotary switch with an OFF position to turn off the power to the transformer for maintenance. Both 277V and 120 V inputs shall be protected on the primary side.
e. Low voltage power supply shall be capable of driving at least 48 relays and their electronics. Such power supply is to have surge protectors on the AC inputs of the power supply to limit spikes into the system. Diode isolated power shall be provided for the electronics separate from the power for the relays. Low voltage power shall have a thermal fuse for current limiting and automatic return of power once the fault has been removed. The data line is to be protected from spikes and from inadvertent connection of 12-volt power to the data line.
f. Control cards that drive the relays shall have the following features:

1) Control cards shall be available to individually drive 2 to 48 relays.
2) All control cards shall be capable of controlling relays in groups or individually to any time schedule or input.
3) Each relay and zone shall be individually controlled by on-board switches. Indicator LED’s indicate status of each relay or zone.
4) A manual override switch shall place all zones in the ON position without overriding the relay button status LED. This is for the purposes of programming and testing without disturbing the loads connected to the panel.
5) Each card has an address button for setting the address of the card.
6) All card parameters are to be stored in non-volatile memory and after a power outage such parameters shall restore system to the programmed status at the time power is restored.
7) Cards shall be controlled by digital switches or other devices mounted on the bus.
8) Each zone shall be capable of timer programming from 1 minute to 4 hours with or without a blink warning before light shut off. These timers may be disabled by a clock or other feature on the bus that prevents “Off Sweeps” from occurring during normal business hours.
9) Each zone shall be capable of driving Normally Open (NO) or Normally Closed relays (NC).

2. Standard Output relays

a. Type: Electrically held SPST relay.

b. Rating: 20 Amp, 277VAC Ballast and Tungsten, 1 HP at 120 VAC, 2 HP at 240 VAC.
c. Number per panel: 2 through 48 as shown on the plans. Micro panels shall have up to 4 relays.
d. Relays are to be individually exchangeable with plug in low voltage connectors. Panels that require more than one relay to be changed in event of single relay failure are not acceptable. No exceptions.
e. Relays shall be rated for 40,000 operations minimum, Normally Closed (NC) and Normally Closed SoftStart (NCSS). All incandescent circuits shall be energized by use of a Normally Closed SoftStart relay. No exceptions.
f. Relays are to incorporate a Class B insulation system to enable them to withstand elevated temperatures.
g. Optional relay types available shall include: Normally Open (NO) relay rated for 100,000 operations; NO and NC relays with at zero cross circuitry rated for 250,000 operations, (NCZC, NOZC); Single Pole, Double Throw (SPDT).

3. Switches

a. Switches of different styles shall be available that fit into “Decora” shaped wall plates. All switches shall be communications based (RS485). Contact closure style switches shall not be acceptable. Any switch button function shall be able to be changed through remote or local programming.
b. Switches shall be available in 1 through 6 button versions with engravable buttons. Indicator LEDs for each button and a constantly ON locator lamp shall be built into each switch.
c. Switches may be programmed to be Momentary ON, Momentary OFF, Toggle or Maintained type switches.
d. Switches shall show the status of the zone or zones controlled by LED output. LEDs for the OFF status shall also indicate as well.
e. Switches by third parties or inputs from EMS system shall be connected to the system bus via a DigiLink input card. (1) DigiLink input card shall provide (14) global programmable inputs.
f. Digital Key Switch (KS2400) shall be available as a single gang device and shall provide a momentary ON and OFF to assigned relays (loads) as programmed.
g. Digital switches shall accept input from a “Key Enable” (KES2400) switch. Key Enable switch shall be able to enable and disable up to (3) single gang digital switches.
h. Contractor to verify all switch types and quantities per plans and specifications.

4. Clock Interface

a. A Digital Astronomical Time Clock (DATC) shall control and program the system and supply all time functions.
b. Such DATC shall be capable of up to (32) schedules. Each schedule shall consist of one set of ON and OFF times per day for a week, with separate schedules for each of (2) holiday lists. The schedules shall apply to a specific group of relays.
c. The DATC shall be capable of controlling up to (126) digital devices on the bus.
d. The DATC shall be able to accept control from a computer or modem via an on-board RS 232 port.
e. The DATC display shall be a (8) line 21-character display. All commands shall be in plain English. Help pages shall contain the manual for the clock in event of loss of the original.
f. The DATC shall be capable of accepting digital thermostat information via a T-Link Interface.
g. The DATC shall be run from non-volatile memory so that all system parameters are maintained indefinitely during power outages. Only the Real Time Clock section of the DATC shall require a battery. Battery shall hold the time for a period of ten years from installation even if system is not powered.

5. Other Interfaces

a. When indicated on the plans, specified system shall provide a dry contact gateway using an interface card. Interface card (DigiLink) shall provide 14 closure (global, programmable) inputs per card with on-board push buttons to simulate a contact closure, and on-board LED load status indication. Dry contact inputs must connect to DigiLink via use of shielded cable.
b. When indicated on the plans, specified system shall provide a Local Area Network Interface (LanLink). LanLink shall connect multiple 128-device buses, (up to 12,000 total devices) via full-duplex twisted pair copper conductors, separate transmitters and receivers and provide up to 8 LAN-Wide universal commands. Each bus can be up to 4,000 feet apart.
c. When indicated on the plans, specified system shall provide a Local Area Network Interface via a fiber optic cable (FiberLink), 2 strands allotted (Duplex 62.5 micron multimode optic fiber cable). FiberLink shall connect multiple 128-device buses, (up to 12,000 total devices) via full-duplex optical transceivers, separate transmitters and receivers and provide up to 8 LAN-Wide universal commands. Each bus can be up to 2 Km apart.
d. When indicated on the plans, specified system shall provide direct digital interface cards (Link To Series) that allows communications based (RS 232, RS485) inputs and outputs to third party EMS systems and third party dimming systems. Link To cards shall provide real time control of any relay or zone in any panel connected on the bus.
e. When indicated on the plans, specified system shall provide a voice prompted telephone override module (TeleLink). TeleLink shall accept up to (3) phone lines and allow up to (3) simultaneous phone calls. Voice prompted menu and up to (999) unique passcodes shall be standard with each TeleLink module.
f. When indicated on the plans, specified system shall provide an exterior (PCO) or interior (PCI) mounted photocell with interface card that provides a read out on the DATC screen in number values analogous to foot-candles with spectral sensitivity similar to the human eye. Each photocell card shall be capable of programming up to (14) trigger points. Each trigger may be set with a unique ON and OFF light level, and may be programmed to control a unique group of relays. All trigger settings shall set through programming only. Photocell system, which requires the use of set screws or which must be programmed at the photocell control card shall be not acceptable.
g. When indicated on the plans, specified system shall provide a direct digital interface card (T-Link) that allows the system DATC to control up to (32) digital, XCI brand, thermostats. Programming of thermostats to be able to done locally (at the DATC or a EMS PC) or remotely, via modem.
h. Specified system shall have software pre-installed to accept Graphical Management Software (GMS) pages. GMS software shall provide via local or remote PC a visual representation of a specific area or the total area of the project. Each GMS page shall be designed to the owner's specifications. Provide ___ GMS Page(s)___ GMS Page(s) Not Required.
i. Modem. Modem shall allow for remote programming from any location using either a PC or similar GR 2400 system device.
j. When indicated on the plans, specified system shall provide a direct digital interface to motorized panelboards. Relay panel and motorized panelboard circuits shall appear on the system software as similar items and maintain all functions and features of the software.
k. Specified system shall have all interfaces listed above available at time of shipment even if a particular interface is not part of the original specification for this project. No exceptions.

2.2 MODES OF OPERATION

A. Softwired Switches: Remote switches shall be able to control any relay or group of relays in the following modes: ON, OFF, Mixed (Some relays ON some OFF), Toggle (first push ON, next OFF etc.) Maintain. Timer ON with a time set from 1 minute to 4 hours. Timer ON with OFF sweep warning, (Blink warning 5 min or as programmed prior to OFF sweep.) Timer ON with Horn Warning (Horn output turns ON for the warning 5 min or as programmed prior to OFF sweep).

B. DATC Operation: DATC shall control any relay or group of relays with the following modes as determined by schedules: ON only, OFF only, maintained, maintained with timer and OFF sweep warning (blink warn), maintained with timer (no blink warning). Timers adjustable from 1 minute to 4 hours. When the scheduled program in the DATC is ON, the associated timers are disabled. When the scheduled program in the DATC is OFF and a relay or zone is overridden, the DATC will put that relay or zone into the timer mode and automatically sweep OFF at the end of the programmed timer period. Timers shall be able to be changed though software, locally and remotely. No exceptions.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION AND DOCUMENTATION

A. Installation: Mount relay control cabinets adjacent to respective lighting panelboard. Cabinet shall be surface or flush mount, per plans. Wiring between relay control cabinet and panelboards to be per local codes and acceptable industry standards. Under no circumstances shall additional fees be authorized for payment to the EC or GC due to the EC's lack of knowledge or understanding of any and all prevailing codes or specified manufacturer's installation requirements. Neatly lace and rack wiring in cabinets.

B. Switch Mounting: Provide outlet boxes, single or multi-gang, as shown on the plans for the low voltage digital switches. Mount switches as per plans. EC is specifically responsible to run the required low voltage cable (Category 5, 4 unshielded twisted pairs) between all switches and panels. All low voltage wire to be run in conduit, per local codes.

C. Wiring (Additional)

1. Do not mix low voltage and high voltage conductors in the same conduit. No exceptions.
2. Ensure low voltage conduits or control wires do not run parallel to current carrying conduits.
3. Place "terminators" at each end of the bus to maintain data integrity, per the manufacturer's recommendations.
4. Neatly lace and rack wiring in cabinets.
5. Land control wires on the de-pluggable connectors provided.
6. Use Category 5, 4 unshielded twisted pair cable for all system low voltage connections. Additional conductors may be required to compensate for voltage drop with specific system designs. Contact LC&D or refer to the GR2400 manual for further information. Use shielded cable for dry contact inputs.
7. Do not exceed 4000ft of wire length for the system bus.
8. All items on the bus shall be connected in sequence. Star and Spur topologies are not acceptable.
9. The specified lighting control system shall be installed and wired as shown on the plans, by the electrical contractor, who shall make all necessary wiring connections to external devices and equipment, to include photocell.

D. Documentation

1. Each relay shall have an identification tag indicating the originating branch circuit number and panelboard name along with the relay number as indicated on the drawings.
2. Each line side branch circuit conductor shall have an identification tag indicating the branch circuit number.
3. Provide a point-to-point wiring diagram for the whole system on the inside cover of each cabinet.
4. Accurate “as built” drawings shall be furnished by the contractor to the owner. These shall indicate the loads controlled by each relay and the identification number for that relay, placement of switches and location of photocell.

3.2 SERVICE, TRAINING, AND SUPPORT

A. Training and Start-Up: EC shall contact LC&D at least 7 days prior to project completion to schedule system start-up. LC&D shall provide a factory-trained representative to program, start-up, and commission the lighting control system. The EC shall be present during the entire programming, start-up, and commissioning process. LC&D shall provide a factory-trained representative to train the Owner in all aspects of operation and programming of the lighting control system. Training shall not be less that (4) hours.

B. Factory Support: Telephone factory support shall be available at no additional cost to the EC or Owner both during and after the warranty period. Factory to pre-program the lighting control system, per plans and specification, to the full extent of the data available. The specified manufacturer, at no added cost, shall provide additional programming via modem as required by the EC or Owner. Manufacturer warrants that the DTC software can be upgraded and monitored remotely. Upon request, manufacturer to provide remote dial up software, at no added cost, to system owner. No exceptions.

END OF SECTION 26 09 50

SECTION 26 23 23 – SINGLE-PHASE CENTRAL BATTERY INVERTERS

PART 1 - GENERAL REQUIREMENTS

1.1 RELATED DOCUMENTS

A. The general conditions, Division 1, and Basic Electrical Requirements (Section 26 05 00) are part of this section and the contract for this work and apply to this section as fully as if repeated herein.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 QUALITY ASSURANCE AND STANDARDS

A. All electrical work shall comply with the latest edition under enforcement, including all amendments, modifications and supplements, of the following codes and standards or other regulations which may apply:

1. American Disabilities Act (ADA)
2. American National Standards Institute (ANSI)
3. American Society for Testing and Materials (ASTM)
4. Institute of Cable Engineers Association (ICEA)
5. Institute of Electrical and Electronic Engineers (IEEE)
6. Local Code Enforcement Agency Requirements
7. National Electrical Code (NEC)
8. National Electrical Contractor's Association (NECA)
9. National Electrical Manufacturer's Association (NEMA)
10. National Electrical Testing Association (NETA)
11. National Fire Protection Association (NFPA)
12. Underwriters' Laboratories, Inc. (UL)
13. International Building Code (IBC)

No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. Any conflicts or changes required to the contract documents in order to obtain compliance with applicable codes shall be brought to the immediate attention of the Engineer, Architect, and Owner's Representative by the Contractor.

B. All items shall be listed by Underwriter’s Laboratories and shall bear the U.L. label.

C. Equipment shown to scale is approximate only and based upon a general class of equipment specified. The Contractor shall verify all dimensions and clearances prior to commencement of work.

D. The Contractor shall verify all points of connection with the manufacturer’s requirements, instructions, or recommendations prior to installation. The actual dimensions, weights, clearance requirements and installation requirements shall be verified and coordinated by the Contractor.

E. 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.

F. Central Battery Inverter System: UL 924 and UL 1778 listed.

G. Comply with NFPA 70 and NFPA 101.

1.3 SUMMARY

A. This Section includes fast-transfer single-phase central battery inverters with the following features:

1. Input circuit breaker.
2. Output distribution section.
3. Internal maintenance bypass/isolation switch.
4. Multiple output voltages.
5. Emergency-only circuits.
6. Remote monitoring provisions.

1.4 DEFINITIONS

A. LCD: Liquid-crystal display.

B. LED: Light-emitting diode.

C. THD: Total harmonic distortion.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Electrical ratings, including the following:

a. Capacity to provide power during failure of normal utility power.
b. Inverter voltage regulation and THD of output current.
c. Rectifier data.
d. Transfer time of transfer switch.
e. Data for optional features.

2. Transfer switch.
3. Inverter.
4. Battery charger.
5. Batteries.
6. Battery monitoring.
7. Battery-cycle warranty monitor.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, components, and location and identification of each field connection. Show access, workspace, and clearance requirements; details of control panels; and battery arrangement.

1. Wiring Diagrams: Detail internal and interconnecting wiring; and power, signal, and control wiring.
2. Elevation and details of control and indication displays.

3. Output distribution section.

C. Manufacturer Seismic Qualification Certification: Submit certification that central battery inverter equipment will withstand seismic forces defined for Seismic Design Category D. Include the following:

1. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
2. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

D. Manufacturers' quality-control tests reports.

E. Operation and Maintenance Data: For central battery inverter equipment to include in emergency, operation, and maintenance manuals.

F. Warranty: Special warranty specified in this Section.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store equipment in spaces having environments controlled within manufacturers' written instructions for ambient temperature and humidity conditions for non-operating equipment.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace batteries that fail in materials or workmanship within 1-year or greater. Special warranty, applying to batteries only, applies to materials only, on a prorated basis, for the period specified.

1. Warranty Period: Include the following warranty periods, from date of Substantial Completion:

a. Premium, Valve-Regulated, Recombinant, Lead-Calcium Batteries:

1) Full Warranty: One (1) year or greater.
2) Pro-rated: 19 years.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Deliver extra materials to the Owner.

1. Fuses: One for every 10 of each type and rating, but no fewer than two (2) of each.
2. Cabinet Ventilation Filters: One complete set.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide a product by one of the following:

1. Dual-Lite, Incorporated.
2. Lithonia Lighting; Emergency Lighting Systems.
3. Myers Power products.

2.2 INVERTER PERFORMANCE REQUIREMENTS

A. Fast-Transfer Single-phase Central Battery Inverters: Automatically sense loss of normal AC supply and use a solid-state switch to transfer loads. Transfer in 0.002 second or less from normal supply to battery-inverter supply.

1. Operation: Unit supplies power to output circuits from a single, external, normal supply source. Unit automatically transfers load from normal source to internal battery/inverter source. Retransfer to normal is automatic when normal power is restored.

B. Maximum Acoustical Noise: 50 dB, "A" weighting, emanating from any component under any condition of normal operation, measured 36 inches from nearest surface of component enclosure.

2.3 SERVICE CONDITIONS

A. Environmental Conditions: Inverter system shall be capable of operating continuously in the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Ambient Temperature for Electronic Components: 0 to 40 degrees C.
2. Relative Humidity: 0 to 95 percent, noncondensing.
3. Altitude: Sea level to 4000 feet.

2.4 INVERTERS

A. Description: Solid-state type, with the following operational features:

1. Automatically regulate output voltage to within plus or minus 5 percent.
2. Automatically regulate output frequency to within plus or minus 1 Hz, from no load to full load at unity power factor over the operating range of battery voltage.
3. Output Voltage Waveform of Unit: Sine wave with maximum 10 percent THD throughout battery operating-voltage range, from no load to full load.

    a. THD may not exceed 5 percent when serving a resistive load of 100 percent of unit rating.

4. Output Protection: Current-limiting and short-circuit protection.
5. Overload Capability: 125 percent for 10 minutes; 150 percent surge.
6. Brownout Protection: Produces rated power without draining batteries when input voltage is down to 75 percent of normal
7. Capability to drive loads with power factors ranging from 0.5 lagging to 0.5 leading.
8. Electrical efficiency exceeding 90%.

2.5 BATTERY CHARGER

A. Description: Solid-state, automatically maintaining batteries in fully charged condition when normal power is available. With LED indicators for "float" and "high-charge" modes.

2.6 BATTERIES

A. Description: Premium, valve-regulated, recombinant, lead-calcium batteries capable of sustaining full-capacity output of inverter unit for minimum of 90 minutes.

2.7 ENCLOSURES

A. NEMA 250, Type 1 steel cabinets with access to components through hinged doors with flush tumbler lock and latch.

B. Finish: Manufacturer's standard baked-enamel finish over corrosion-resistant primer treatment.

2.8 SEISMIC REQUIREMENTS

A. Central battery inverter assemblies, subassemblies, components, fastenings, supports, and mounting and anchorage devices shall be designed and fabricated to withstand Seismic Design Category D 4 forces.

2.9 CONTROL AND INDICATION

A. Description: Group displays, indications, and basic system controls on common control panel on front of central battery inverter enclosure.

B. Minimum displays, indicating devices, and controls shall include those in lists below. Provide sensors, transducers, terminals, relays, and wiring required to support listed items. Alarms shall include an audible signal and a visual display.

C. Indications: Plain-language messages on a digital LCD or LED.

1. Quantitative Indications:

a. Input voltage.
b. Input current.
c. System output voltage.
d. System output current.
e. System output frequency.
f. DC bus voltage.
g. Battery current and direction (charge/discharge).
h. Elapsed time-discharging battery.

2. Basic Status Condition Indications:

a. Normal operation.
b. Load-on bypass.
c. Load-on battery.
d. Inverter off.
e. Alarm condition exists.

3. Alarm Indications:

a. Battery system alarm.
b. Control power failure.
c. Fan failure.
d. Overload.

e. Battery-charging control faulty.
f. Input overvoltage or undervoltage.
g. Approaching end of battery operation.
h. Battery undervoltage shutdown.
i. Inverter fuse blown.
j. Inverter overtemperature.
k. Static bypass transfer switch overtemperature.
l. Inverter power supply fault.
m. Inverter output overvoltage or undervoltage.
n. System overload shutdown.
o. Inverter output contactor open.
p. Inverter current limit.

4. Controls:

a. Inverter on-off.
b. Start.
c. Battery test.
d. Alarm silence/reset.
e. Output-voltage adjustment.

D. Dry-form "C" contacts shall be available for remote indication of the following conditions:

1. Inverter on battery.
2. Inverter on-line.
3. Inverter load-on bypass.
4. Inverter in alarm condition.
5. Inverter off (maintenance bypass closed).

E. Include the following minimum indicator array:

1. Ready, normal-power on light.
2. Charge light.
3. Inverter supply load light.
4. Battery voltmeter.
5. AC output voltmeter with minimum accuracy of 2 percent of full scale.
6. Load ammeter.
7. Test switch to simulate AC failure.

2.10 OPTIONAL FEATURES TO BE FURNISHED

A. Multiple Output Voltages: Supply unit branch circuits at different voltage levels if required. Transform voltages internally as required to produce indicated output voltages.

B. Maintenance Bypass/Isolation Switch: Switch is interlocked so it cannot be operated unless static bypass transfer switch is in bypass mode. Switch provides manual selection among the following three conditions without interrupting supply to the load during switching:

1. Full Isolation: Load is supplied, bypassing central battery inverter system. Normal AC input circuit, static bypass transfer switch, and central battery inverter load terminals are completely disconnected from external circuits.
2. Maintenance Bypass: Load is supplied, bypassing central battery inverter system. Central battery inverter AC supply terminals are energized to permit operational checking, but system load terminals are isolated from the load.
3. Normal: Normal central battery inverter AC supply terminals are energized and the load is supplied either through static bypass transfer switch and central battery inverter rectifier-charger and inverter or through battery and inverter.

2.11 OUTPUT DISTRIBUTION SECTION

A. Panelboard: Comply with Division 26 Section "Panelboards" except provide assembly integral to equipment cabinet

2.12 SYSTEM MONITORING AND ALARMS

A. Remote Status and Alarm Panel: Labeled LEDs on panel faceplate shall indicate five (5) basic status conditions. Audible signal indicates alarm conditions. Silencing switch in face of panel silences signal without altering visual indication.

1. Cabinet and Faceplate: Surface or flush mounted to suit mounting conditions indicated.

B. Provisions for Remote Computer Monitoring: Communication module in unit control panel provides capability for remote monitoring of status, parameters, and alarms specified in Part 2 "Control and Indication" Article. Remote computer and connecting signal wiring will be provided by Owner. Include the following features:

1. Connectors and network interface units or modems for data transmission via RS-232 link.
2. Software shall be designed to control and monitor inverter system functions and to provide on-screen explanations, interpretations, diagnosis, action guidance, and instructions for use of monitoring indications and development of reports. Include capability for storage and analysis of power-line transient records. Software shall be compatible with the operating system and configuration of Owner-furnished computers.

C. Battery Ground-Fault Detector: Initiates alarm when resistance to ground of positive or negative bus of battery is less than 5000 ohms.

1. Annunciation of Alarms: At inverter system control panel.

D. Battery-Cycle Warranty Monitoring: Electronic device, acceptable to battery manufacturer as a basis for warranty action, for monitoring charge-discharge cycle history of batteries covered by cycle-life warranty.

1. Basic Functional Performance: Automatically measures and records each discharge event, classifies it according to duration category, and totals discharges according to warranty criteria, displaying remaining warranted battery life on integral LCD.
2. Additional monitoring functions and features shall include the following:

a. Measuring and recording of total voltage at battery terminals; providing alarm for excursions outside proper float voltage level.
b. Monitoring of ambient temperature at battery and initiating an alarm if temperature deviates from normally acceptable range.
c. Keypad on device front panel provides access to monitored data using front panel display.
d. Alarm contacts arranged to provide remote alarm for abnormal battery voltage or battery temperature.
e. Memory device to store recorded data in nonvolatile electronic memory.
f. RS232 port to permit downloading of data to a portable personal computer.
g. Modem to make measurements and recorded data accessible to remote personal computer via telephone line. Computer will be provided by Owner.

2.13 MANUFACTURER QUALITY CONTROL

A. Factory test complete inverter system, including battery, before shipment. Include the following:

1. Functional test and demonstration of all functions, controls, indicators, sensors, and protective devices.
2. Full-load test.
3. Transient-load response test.
4. Overload test.
5. Power failure test.

B. Test results. Include the following data:

1. Description of input source and output loads used. Describe actions required to simulate source load variation and various operating conditions and malfunctions.
2. List of indications, parameter values, and system responses considered satisfactory for each test action. Include tabulation of actual observations during test.
3. List of instruments and equipment used in factory tests.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance.

1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment will be 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 INSTALLATION

A. Install system components on concrete base and attach by bolting.

1. Design each fastener and support to carry load indicated by Seismic Design Category D requirements.
2. Concrete Bases: 4 inches high, reinforced, with chamfered edges. Extend base no more than 3 inches in all directions beyond the maximum dimensions of switchgear unless otherwise indicated or unless required for seismic anchor support.
3. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
5. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

B. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.

3.3 CONNECTIONS

A. Connections: Interconnect system components. Make connections to supply and load circuits according to manufacturer's wiring diagrams, unless otherwise indicated.

B. Ground equipment according to Division 26 Section "Grounding and Bonding."

1. Separately Derived Systems: Make grounding connections to grounding electrodes and bonding connections to metallic piping systems as indicated; comply with NFPA 70.

C. Connect wiring according to Division 26 Section "Wire and Cable."

3.4 IDENTIFICATION

A. Identify equipment and components according to Division 26 Section "Electrical Identification."

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.

B. Perform tests and inspections and prepare test reports.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Inspect interiors of enclosures for integrity of mechanical and electrical connections, component type and labeling verification, and ratings of installed components.
2. Test manual and automatic operational features and system protective and alarm functions.
3. Test communication of status and alarms to remote monitoring equipment.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Remove and replace malfunctioning units and retest as specified above.

3.6 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Verify that central battery inverter is installed and connected according to the Contract Documents.

C. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements in Division 26 Sections.

D. Complete installation and startup checks according to manufacturer's written instructions.

3.7 ADJUSTING AND CLEANING

A. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

B. Install new filters in each equipment cabinet within 14 days from date of Substantial Completion.

3.8 DEMONSTRATION AND DOCUMENTATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain central battery inverters for a minimum of (4) four hours.

B. Provide manufacturer’s Operation and Maintenance manuals to the Owner’s maintenance personnel at project close-out.

END OF SECTION 26 23 23

SECTION 26 23 24 – THREE-PHASE CENTRAL BATTERY INVERTERS

PART 1 - GENERAL REQUIREMENTS

1.1 RELATED DOCUMENTS

A. The general conditions, Division 1, and Basic Electrical Requirements (Section 26 05 00) are part of this section and the contract for this work and apply to this section as fully as if repeated herein.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 QUALITY ASSURANCE AND STANDARDS

A. All electrical work shall comply with the latest edition under enforcement, including all amendments, modifications and supplements, of the following codes and standards or other regulations which may apply:

1. American Disabilities Act (ADA)
2. American National Standards Institute (ANSI)
3. American Society for Testing and Materials (ASTM)
4. Institute of Cable Engineers Association (ICEA)
5. Institute of Electrical and Electronic Engineers (IEEE)
6. Local Code Enforcement Agency Requirements
7. National Electrical Code (NEC)
8. National Electrical Contractors Association (NECA)
9. National Electrical Manufacturer's Association (NEMA)
10. National Electrical Testing Association (NETA)
11. National Fire Protection Association (NFPA)
12. Underwriters' Laboratories, Inc. (UL)
13. International Building Code (IBC)

No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. Any conflicts or changes required to the contract documents in order to obtain compliance with applicable codes shall be brought to the immediate attention of the Engineer, Architect, and Owner's Representative by the Contractor.

B. All items shall be listed by Underwriter’s Laboratories and shall bear the U.L. label.

C. Equipment shown to scale is approximate only and based upon a general class of equipment specified. The Contractor shall verify all dimensions and clearances prior to commencement of work.

D. The Contractor shall verify all points of connection with the manufacturer’s requirements, instructions, or recommendations prior to installation. The actual dimensions, weights, clearance requirements and installation requirements shall be verified and coordinated by the Contractor.

E. 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.

F. Central Battery Inverter System: UL 924 and UL 1778 listed.

G. Comply with NFPA 70 and NFPA 101.

1.3 SUMMARY

A. This Section includes fast-transfer single-phase central battery inverters with the following features:

1. Input circuit breaker.
2. Output distribution center.
3. Internal maintenance bypass/isolation switch.
4. Multiple output voltages.
5. Emergency-only circuits.
6. Remote monitoring provisions.

1.4 DEFINITIONS

A. LCD: Liquid-crystal display.

B. LED: Light-emitting diode.

C. THD: Total harmonic distortion.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Electrical ratings, including the following:

a. Capacity to provide power during failure of normal utility power.
b. Inverter voltage regulation and THD of output current.
c. Rectifier data.
d. Transfer time of transfer switch.
e. Data for optional features.

2. Transfer switch.
3. Inverter.
4. Battery charger.
5. Batteries.
6. Battery monitoring.
7. Battery-cycle warranty monitor.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, components, and location and identification of each field connection. Show access, workspace, and clearance requirements; details of control panels; and battery arrangement.

1. Wiring Diagrams: Detail internal and interconnecting wiring; and power, signal, and control wiring.
2. Elevation and details of control and indication displays.

3. Output distribution section.

C. Manufacturer Seismic Qualification Certification: Submit certification that central battery inverter equipment will withstand seismic forces defined for Seismic Design Criteria D. Include the following:

1. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
2. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

D. Manufacturers' quality-control test reports.

E. Operation and Maintenance Data: For single-phase central battery inverter equipment to include complete maintenance manuals, complete operating manuals, and complete training materials.

F. Warranty: Special warranty specified in this Section.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store equipment in spaces having environments controlled within manufacturers' written instructions for ambient temperature and humidity conditions for non-operating equipment.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace internal components including batteries that fail in materials or workmanship within specified warranty period. Special warranty, applying to batteries only, applies to materials only, on a prorated basis, for a period specified.

1. Warranty Period: Include the following warranty periods, from date of Substantial Completion:

a. Premium, Valve-Regulated, Recombinant, Lead-Calcium Batteries:

1) Full Warranty: One (1) year.
2) Pro-rated: 19 years.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Deliver extra materials to Owner.

1. Fuses: One for every 10 of each type and rating, but no fewer than two (2) of each.
2. Cabinet Ventilation Filters: One complete set.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide a product by one of the following:

1. Dual-Lite, Incorporated.
2. Lithonia Lighting; Emergency Lighting Systems.
3. Myers Power products.

2.2 INVERTER PERFORMANCE REQUIREMENTS

A. UPS-Type Central Battery Inverters: Continuously provide AC power to connected electrical system.

1. Automatic Operation:

a. Normal Conditions: Supply the load with AC power flowing from normal AC power input terminals, through rectifier-charger and inverter, with battery connected in parallel with rectifier-charger output.
b. Abnormal Supply Conditions: If normal AC supply deviates from specified and adjustable voltage, voltage waveform, or frequency limits, battery supplies constant, regulated, inverter AC power output to the load without switching or disturbance.
c. If normal power fails, battery continues supply-regulated ac power through the inverter to the load without switching or disturbance.
d. When power is restored at normal supply terminals of system, controls automatically synchronize inverter with the external source before transferring the load. Rectifier-charger then supplies power to the load through the inverter and simultaneously recharges battery.
e. If battery becomes discharged and normal supply is available, rectifier-charger charges battery. When battery is fully charged, rectifier-charger automatically shifts to float-charge mode.
f. If any element of central battery inverter system fails and power is available at normal supply terminals of system, static bypass transfer switch transfers the load to normal AC supply circuit without disturbance or interruption of supply.
g. If a fault occurs in system supplied by central battery inverter and current flows in excess of the overload rating of central battery inverter system, static bypass transfer switch operates to bypass fault current to normal ac supply circuit for fault clearing.
h. When fault has cleared, static bypass transfer switch returns the load to central battery inverter system.
i. If battery is disconnected, central battery inverter continues to supply power to the load with no degradation of its regulation of voltage and frequency of output bus.

2. Manual Operation:

a. Turning inverter off causes static bypass transfer switch to transfer the load directly to normal AC supply circuit without disturbance or interruption.

B. Maximum Acoustical Noise: 50 dB, "A" weighting, emanating from any component under any condition of normal operation, measured 36 inches from nearest surface of component enclosure.

2.3 SERVICE CONDITIONS

A. Environmental Conditions: Inverter system shall be capable of operating continuously in the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Ambient Temperature for Electronic Components: 0 to 40 degrees C.
2. Relative Humidity: 0 to 95 percent, noncondensing.
3. Altitude: Sea level to 4000 feet.

2.4 INVERTERS

A. Description: Solid-state type, with the following operational features:

1. Automatically regulate output voltage to within plus or minus 5 percent.
2. Automatically regulate output frequency to within plus or minus 1 Hz, from no load to full load at unity power factor over the operating range of battery voltage.
3. Output Voltage Waveform of Unit: Sine wave with maximum 10 percent THD throughout battery operating-voltage range, from no load to full load.

    a. THD may not exceed 5 percent when serving a resistive load of 100 percent of unit rating.

4. Output Protection: Current-limiting and short-circuit protection via circuit breaker.
5. Overload Capability: 125 percent for 10 minutes; 150 percent surge.
6. Brownout Protection: Produces rated power without draining batteries when input voltage is down to 75 percent of normal
7. Capability to drive loads with power factors ranging from 0.5 lagging to 0.5 leading.
8. Electrical efficiency exceeding 90%.

2.5 BATTERY CHARGER

A. Description: Solid-state, automatically maintaining batteries in fully charged condition when normal power is available. With LED indicators for "float" and "high-charge" modes.

2.6 BATTERIES

A. Description: Premium, valve-regulated, recombinant, lead-calcium batteries Capable of sustaining full-capacity output of inverter unit for minimum of 90 minutes.

2.7 ENCLOSURES

A. NEMA 250, Type 1 steel cabinets with access to components through hinged doors with flush tumbler lock and latch.

B. Finish: Manufacturer's standard baked-enamel finish over corrosion-resistant prime treatment.

2.8 SEISMIC REQUIREMENTS

A. Central battery inverter assemblies, subassemblies, components, fastenings, supports, and mounting and anchorage devices shall be designed and fabricated to withstand Seismic Design Category D forces.

2.9 CONTROL AND INDICATION

A. Description: Group displays, indications, and basic system controls on common control panel on front of central battery inverter enclosure.

B. Minimum displays, indicating devices, and controls shall include those in lists below. Provide sensors, transducers, terminals, relays, and wiring required to support listed items. Alarms shall include an audible signal and a visual display.

C. Indications: Plain-language messages on a digital LCD or LED.

1. Quantitative Indications:

a. Input voltage.
b. Input current.
c. System output voltage.
d. System output current.
e. System output frequency.
f. DC bus voltage.
g. Battery current and direction (charge/discharge).
h. Elapsed time-discharging battery.

2. Basic Status Condition Indications:

a. Normal operation.
b. Load-on bypass.
c. Load-on battery.
d. Inverter off.
e. Alarm condition exists.

3. Alarm Indications:

a. Battery system alarm.
b. Control power failure.
c. Fan failure.
d. Overload.
e. Battery-charging control faulty.
f. Input overvoltage or undervoltage.
g. Approaching end of battery operation.
h. Battery undervoltage shutdown.
i. Inverter fuse blown.
j. Inverter overtemperature.
k. Static bypass transfer switch overtemperature.
l. Inverter power supply fault.
m. Inverter output overvoltage or undervoltage.
n. System overload shutdown.
o. Inverter output contactor open.
p. Inverter current limit.

4. Controls:

a. Inverter on-off.
b. Start.
c. Battery test.
d. Alarm silence/reset.
e. Output-voltage adjustment.

D. Dry-form "C" contacts shall be available for remote indication of the following conditions:

1. Inverter on battery.
2. Inverter on-line.
3. Inverter load-on bypass.
4. Inverter in alarm condition.

5. Inverter off (maintenance bypass closed).

E. Include the following minimum indicator array:

1. Ready, normal-power on light.
2. Charge light.
3. Inverter supply load light.
4. Battery voltmeter.
5. AC output voltmeter with minimum accuracy of 2 percent of full scale.
6. Load ammeter.
7. Test switch to simulate ac failure.

F. Enclosure: Steel, with hinged lockable doors, suitable for floor mounting. Manufacturer's standard corrosion-resistant finish.

2.10 OPTIONAL FEATURES TO BE FURNISHED

A. Multiple Output Voltages: Supply unit branch circuits at different voltage levels if required. Transform voltages internally as required to produce indicated output voltages.

B. Maintenance Bypass/Isolation Switch: Switch is interlocked so it cannot be operated unless static bypass transfer switch is in bypass mode. Switch provides manual selection among the following three conditions without interrupting supply to the load during switching:

1. Full Isolation: Load is supplied, bypassing central battery inverter system. Normal ac input circuit, static bypass transfer switch, and central battery inverter load terminals are completely disconnected from external circuits.
2. Maintenance Bypass: Load is supplied, bypassing central battery inverter system. Central battery inverter AC supply terminals are energized to permit operational checking, but system load terminals are isolated from the load.
3. Normal: Normal central battery inverter AC supply terminals are energized and the load is supplied either through static bypass transfer switch and central battery inverter rectifier-charger and inverter or through battery and inverter.

2.11 OUTPUT DISTRIBUTION SECTION

A. Panelboard: Comply with Division 26 Section "Panelboards" except provide assembly integral to equipment cabinet

2.12 SYSTEM MONITORING AND ALARMS

A. Remote Status and Alarm Panel: Labeled LEDs on panel faceplate shall indicate five (5) basic status conditions. Audible signal indicates alarm conditions. Silencing switch in face of panel silences signal without altering visual indication.

1. Cabinet and Faceplate: Surface or flush mounted to suit mounting conditions indicated.

B. Provisions for Remote Computer Monitoring: Communication module in unit control panel provides capability for remote monitoring of status, parameters, and alarms specified in Part 2 "Control and Indication" Article. Remote computer and connecting signal wiring will be provided by Owner. Include the following features:

1. Connectors and network interface units or modems for data transmission via RS-232 link.

2. Software shall be designed to control and monitor inverter system functions and to provide on-screen explanations, interpretations, diagnosis, action guidance, and instructions for use of monitoring indications and development of reports. Include capability for storage and analysis of power-line transient records. Software shall be compatible with the operating system and configuration of Owner-furnished computers.

C. Battery Ground-Fault Detector: Initiates alarm when resistance to ground of positive or negative bus of battery is less than 5000 ohms.

1. Annunciation of Alarms: At inverter system control panel.

D. Battery-Cycle Warranty Monitoring: Electronic device, acceptable to battery manufacturer as a basis for warranty action, for monitoring charge-discharge cycle history of batteries covered by cycle-life warranty.

1. Basic Functional Performance: Automatically measures and records each discharge event, classifies it according to duration category, and totals discharges according to warranty criteria, displaying remaining warranted battery life on integral LCD.
2. Additional monitoring functions and features shall include the following:

a. Measuring and recording of total voltage at battery terminals; providing alarm for excursions outside proper float voltage level.
b. Monitoring of ambient temperature at battery and initiating an alarm if temperature deviates from normally acceptable range.
c. Keypad on device front panel provides access to monitored data using front panel display.
d. Alarm contacts arranged to provide remote alarm for abnormal battery voltage or battery temperature.
e. Memory device to store recorded data in nonvolatile electronic memory.
f. RS-232 port to permit downloading of data to a portable personal computer.
g. Modem to make measurements and recorded data accessible to remote personal computer via telephone line. Computer will be provided by Owner.

2.13 MANUFACTURER QUALITY CONTROL

A. Factory test complete inverter system, including battery, before shipment. Include the following:

1. Functional test and demonstration of all functions, controls, indicators, sensors, and protective devices.
2. Full-load test.
3. Transient-load response test.
4. Overload test.
5. Power failure test.

B. Test results. Include the following data:

1. Description of input source and output loads used. Describe actions required to simulate source load variation and various operating conditions and malfunctions.
2. List of indications, parameter values, and system responses considered satisfactory for each test action. Include tabulation of actual observations during test.
3. List of instruments and equipment used in factory tests.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance.

1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment will be 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 INSTALLATION

A. Install system components on concrete base and attach by bolting.

1. Design each fastener and support to carry load indicated by Seismic Design Category D requirements.
2. Concrete Bases: 4 inches high, reinforced, with chamfered edges. Extend base no more than 3 inches in all directions beyond the maximum dimensions of switchgear unless otherwise indicated or unless required for seismic anchor support.
3. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
5. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

B. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.

3.3 CONNECTIONS

A. Connections: Interconnect system components. Make connections to supply and load circuits according to manufacturer's wiring diagrams, unless otherwise indicated.

B. Ground equipment according to Division 26 Section "Grounding and Bonding."

1. Separately Derived Systems: Make grounding connections to grounding electrodes and bonding connections to metallic piping systems as indicated; comply with NFPA 70.

C. Connect wiring according to Division 26 Section "Wire and Cable."

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.

B. Perform tests and inspections and prepare test reports.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Inspect interiors of enclosures for integrity of mechanical and electrical connections, component type and labeling verification, and ratings of installed components.
2. Test manual and automatic operational features and system protective and alarm functions.
3. Test communication of status and alarms to remote monitoring equipment.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Remove and replace malfunctioning units and retest as specified above.

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Verify that central battery inverter is installed and connected according to the Contract Documents.

C. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements in Division 26 Sections.

D. Complete installation and startup checks according to manufacturer's written instructions.

3.6 ADJUSTING AND CLEANING

A. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

B. Install new filters in each equipment cabinet within 14 days from date of Substantial Completion.

3.7 DEMONSTRATION AND DOCUMENTATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain central battery inverters for a minimum of (4) four hours.

B. Provide manufacturer’s Operation and Maintenance manuals to the Owner’s maintenance personnel at project close-out.

END OF SECTION 26 23 24

SECTION 26 24 13 - SWITCHBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general conditions, Division 1, and Basic Electrical Requirements (Section 26 05 00) are part of this section and the contract for this work and apply to this section as fully as if repeated herein.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 QUALITY ASSURANCE AND STANDARDS

A. All work, material or equipment shall comply with the codes, ordinances and regulations of the local government having jurisdiction, including the regulations of serving utilities and any participating government agencies having jurisdiction.

B. All electrical work shall comply with the latest edition under enforcement including all amendments, modifications, and supplements of the following codes and standards or other regulations which may apply:

1. American Disabilities Act (ADA)
2. American National Standards Institute (ANSI)
3. American Society for Testing and Materials (ASTM)
4. Institute of Cable Engineers Association (ICEA)
5. Institute of Electrical and Electronic Engineers (IEEE)
6. Local Code Enforcement Agency Requirements
7. National Electrical Code (NEC)
8. National Electrical Contractor's Association (NECA)
9. National Electrical Manufacturer's Association (NEMA)
10. National Electrical Testing Association (NETA)
11. National Fire Protection Association (NFPA)
12. Underwriter's Laboratories, Inc.(UL)
13. International Building Code (IBC)

No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. Any conflicts or changes required to the contract documents in order to obtain compliance with applicable codes shall be brought to the immediate attention of the Architect, Engineer, and Owner's Representative by the Contractor.

C. All items shall be listed by Underwriter's Laboratories and shall bear the U.L. label.

D. Equipment shown to scale is approximate only and based upon a general class of equipment specified. The Contractor shall verify all dimensions and clearances prior to commencement of work.

E. The Contractor shall verify all points of connection with the manufacturer's requirements, instructions, or recommendations prior to installation. The actual dimensions, weights, clearance requirements and installation requirements shall be verified and coordinated by the

contractor.

1.3 SUBMITTALS

A. Submit shop drawings per Section 26 05 00 for review including the following:

1. Switchboards
2. Overcurrent protection
3. Instrumentation
4. Dimensions, weights, ratings, and layouts
5. Device settings and trip ratings

PART 2 - PRODUCTS

2.1 Switchboards shall be factory assembled, dead-front, metal enclosed, self-supporting floor standing sections as noted in the construction documents.

2.2 Vertical sections shall contain overcurrent protective devices including circuit breakers and fuses and shall be nominally 90" in height.

2.3 Switchboard finish shall be baked enamel factory paint of manufacturer's standard color.

2.4 Provide front accessibility for wireways on each side of overcurrent protective devices for entire height of section. Provide welded steel framework with screw covers removable from the front; covers may be hinged.

2.5 All bussing shall be silver-coated copper (maximum 1000A/square inch current density) with ratings as indicated in the construction documents.

2.6 Switchboard, bussing, and devices shall be fully-rated for the available short circuit current as determined by the Contractor's short circuit study (see 2.16 below), inclusive of all motor contribution and utility contribution. The minimum AIC ratings of the equipment may exceed those indicated on the construction documents, due to the results of the Contractor's short circuit study. The Contractor shall include all study costs and resultant equipment costs during bidding. The Contractor may provide series-rated equipment, fully compliant with all NEC requirements and the short circuit study, but shall not provide series-rated equipment without explicit written permission from the Engineer.

2.7 Switchboards shall be equipped with lifting eyes.

2.8 Switchboards shall be suitable for the environment in which they are located and shall be NEMA 1, indoor, and rated for Seismic Design Category D, unless noted otherwise on the construction documents.

2.9 Main circuit breakers shall be provided and shall be insulated case solid-state (LSIG) trip type with ratings as noted. Main breakers shall be 100% rated devices.

2.10 Main circuit breaker shall be individually mounted, unless noted otherwise.

2.11 Main circuit breaker shall have maximum closing time of five (5) cycles, three (3) cycles upon opening.

2.12 Main circuit breaker shall have field-replaceable trip plugs.

2.13 Distribution circuit breakers shall be molded case type. All circuit breakers shall be bolt-on type.

2.14 Cross bussing shall be fully rated (maximum 1000A/square inch current density) for the length of the switchboard.

2.15 Instrumentation shall be provided where noted. Utility company metering shall be provided in accordance with the serving utility company requirements.

2.16 The Contractor shall contract a California Registered Professional Electrical Engineer to furnish and submit a coordination/short circuit study (using SKM “Power Tools” software or equal) for the entire system provided including long time, short time, instantaneous, and ground fault settings.

2.17 Provide permanently adhered “bakelite” labels indicating the identification of each device on the switchboard adjacent to the device and visible on the enclosure exterior.

2.18 Provide a ground bus in each switchboard section with connecting ground bonds between sections. Ground bus shall be rated at 30% of the incoming capacity.

2.19 Rodent-proof ventilation as required to maintain allowable temperature rise at rated capacity.

2.20 Acceptable manufacturers shall be General Electric, Siemens, Eaton, or Square D.

PART 3 - EXECUTION

3.1 Installation method of switchboards shall comply with the latest enforced edition of the National Electrical Code and the authority having jurisdiction.

3.2 Install all switchboards in accordance with the manufacturer’s recommendations and requirements.

3.3 Coordinate switchboard location and size with architectural and interior drawings. Coordinate with other trades to identify conflicts with switchboard locations and notify the Engineer of any conflicts.

3.4 Coordinate switchboard size with concrete housekeeping pads.

3.5 Check all connections, phase rotation, ground resistance and insulation resistance levels.

3.6 Ground fault protective devices shall be tested by an approved third party testing agency and a written report submitted with the operation manual for review.

3.7 Test all switchboards and overcurrent protection devices for voltage level, continuity, ground fault, and short circuits.

3.8 Install all switchboards plumb and square to structure and adjacent surfaces.

3.9 Connect and inspect all ground bonds prior to energizing switchboard.

3.10 Demonstrate the proper operation of all ground fault protective devices.

3.11 Clean all switchboard interiors and exteriors to be free of dirt, dust and debris prior to handing over to Owner. Touch up scratched paint and finishes as necessary.

3.12 Adjust and set all devices for proper operation. Set all protective devices as per the written

report recommendations.

3.13 Install 24 X 18” metal frame in the electrical room and include a “one line” electrical diagram of the building.

END OF SECTION 26 24 13

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general conditions, Division 1, and Basic Electrical Requirements (Section 26 05 00) are part of this section and the contract for this work and apply to this section as fully as if repeated herein.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 QUALITY ASSURANCE AND STANDARDS

A. All work, material or equipment shall comply with the codes, ordinances and regulations of the local government having jurisdiction, including the regulations of serving utilities and any participating government agencies having jurisdiction.

B. All electrical work shall comply with the latest edition under enforcement including all amendments, modifications, and supplements of the following codes and standards or other regulations which may apply:

1. American Disabilities Act (ADA)
2. American National Standards Institute (ANSI)
3. American Society for Testing and Materials (ASTM)
4. Institute of Cable Engineers Association (ICEA)
5. Institute of Electrical and Electronic Engineers (IEEE)
6. Local Code Enforcement Agency Requirements
7. National Electrical Code (NEC)
8. National Electrical Contractors Association (NECA)
9. National Electrical Manufacturer's Association (NEMA)
10. National Electrical Testing Association (NETA)
11. National Fire Protection Association (NFPA)
12. Underwriter's Laboratories, Inc.(UL)
13. International Building Code (IBC)

No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. Any conflicts or changes required to the contract documents in order to obtain compliance with applicable codes shall be brought to the immediate attention of the Architect, Engineer, and Owner's Representative by the Contractor.

C. All items shall be listed by Underwriter's Laboratories and shall bear the UL label.

D. Equipment shown to scale is approximate only and based upon a general class of equipment specified. The Contractor shall verify all dimensions and clearances prior to commencement of work.

E. The Contractor shall verify all points of connection with the manufacturer's requirements, instructions, or recommendations prior to installation. The actual dimensions, weights, clearance requirements and installation requirements shall be verified and coordinated by the

contractor.

1.3 SUBMITTALS

A. Submit shop drawings per Section 26 05 00 for review including the following:

1. Panelboards
2. Overcurrent protection, bus capacity, main ratings, AIC rating
3. Mounting, enclosure, dimensions
4. Voltage, ratings, and phases
5. Device settings, trip ratings, and layout

PART 2 - PRODUCTS

2.1 Panelboards shall be factory assembled, dead-front, metal enclosed, wall mounted type as noted in the construction documents.

2.2 Panelboards shall be rated 600VAC and shall not exceed 400A current capacity, unless specifically noted on the construction documents.

2.3 Panelboard finish shall be baked enamel factory paint of manufacturer's standard color.

2.4 Provide front accessibility for wireways on each side of overcurrent protective devices for entire height of panelboard.

2.5 All bussing shall be silver-plated copper with ratings as indicated in the construction documents. Provide full size neutral and ground bars.

2.6 Panelboard bussing and devices shall be fully-rated for the available short circuit current as determined by the Contractor's short circuit study (see requirements in Section 26 24 13).

2.7 Enclosures shall be galvanized sheet steel cabinet type with hinged and lockable doors, dead front, and permanently adhered identification labels on the front.

2.8 Panelboards shall be suitable for the environment in which they are located and shall be NEMA 3R, outdoor, unless noted otherwise on the construction documents.

2.9 Circuit breakers shall be molded case type; all circuit breakers shall be bolt-on type.

2.10 Arc fault circuit interrupting (AFCI) circuit breakers shall be provided for all dwelling unit bedroom receptacle circuits. AFCI circuit breakers shall be manufactured and listed to UL Standard 1699.

2.11 Main lugs shall be anti-turn solderless pressure type for use with copper conductors.

2.12 Instrumentation shall be provided where noted.

2.13 Enclosures, panel interiors, and devices shall be of one manufacture.

2.14 Provide a typewritten panel schedule located in a sleeve on the interior of the panelboard door indicating loads and areas connected to each circuit.

2.15 Provide a ground bus in each panelboard.

2.16 Acceptable manufacturers shall be General Electric, Siemens, Eaton, or Square D.

PART 3 - EXECUTION

3.1 Installation method of panelboards shall comply with the latest enforced edition of the National Electrical Code and the authority having jurisdiction.

3.2 Install all panelboards in accordance with the manufacturer's recommendations and requirements.

3.3 Coordinate panelboard location and size with architectural and interior drawings. Coordinate with other trades to identify conflicts with panelboard locations and notify the Engineer of any conflicts.

3.4 Fasten panelboards securely to structural wall or surface to Seismic Design Category D requirements. Panelboards shall be mounted no higher than 6'0" to the highest device from finished floor and no lower than 24" above finished floor. Provide panel skirts where noted.

3.5 Provide a minimum of five (5) empty ¾" conduits out of each recessed panelboard to an accessible location above ceiling. Identify each as "SPARE".

3.6 Check all connections, phase rotation, ground resistance and insulation resistance levels.

3.7 Complete the panel schedule card and place in the sleeve on the interior of the panelboard door.

3.8 Main Switch and all circuit breakers will be supplied with a name plate adjacent to each device as specified under Marking and Name plates.

3.9 Test all panelboards and overcurrent protection devices for voltage level, continuity, ground fault, and short circuits.

3.10 Install all panelboards plumb and square to structure and adjacent surfaces.

3.11 Connect and inspect all ground bonds prior to energizing panelboard.

3.12 Demonstrate the proper operation of all ground fault protective devices.

3.13 Clean all panelboard interiors and exteriors prior to handing over to Owner. Touch up scratched paint and finishes as necessary.

3.14 Adjust and set all devices for proper operation.

END OF SECTION 26 24 16

SECTION 26 27 26 - WIRING DEVICES AND CONNECTORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general conditions, Division 1, and Basic Electrical Requirements (Section 26 05 00) are part of this section and the contract for this work and apply to this section as fully as if repeated herein.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 QUALITY ASSURANCE AND STANDARDS

A. All work, material or equipment shall comply with the codes, ordinances and regulations of the local government having jurisdiction, including the regulations of serving utilities and any participating government agencies having jurisdiction.

B. All electrical work shall comply with the latest edition under enforcement including all amendments, modifications, and supplements of the following codes and standards or other regulations which may apply:

1. American Disabilities Act (ADA)
2. American National Standards Institute (ANSI)
3. American Society for Testing and Materials (ASTM)
4. Institute of Cable Engineers Association (ICEA)
5. Institute of Electrical and Electronic Engineers (IEEE)
6. Local Code Enforcement Agency Requirements
7. National Electrical Code (NEC)
8. National Electrical Contractor's Association (NECA)
9. National Electrical Manufacturer's Association (NEMA)
10. National Electrical Testing Association (NETA)
11. National Fire Protection Association (NFPA)
12. Underwriter's Laboratories, Inc. (UL)
13. International Building Code (IBC)

No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. Any conflicts or changes required to the contract documents in order to obtain compliance with applicable codes shall be brought to the immediate attention of the Owner's Representative by the contractor.

C. All items shall be listed by Underwriter's Laboratories and shall bear the UL label.

D. Equipment shown to scale is approximate only and based upon a general class of equipment specified. The Contractor shall verify all dimensions and clearances prior to commencement of work.

E. The Contractor shall verify all points of connection with the manufacturer's requirements, instructions, or recommendations prior to installation. The actual dimensions, weights, clearance requirements and installation requirements shall be verified and coordinated by the contractor.

1.3 SUBMITTALS

A. Submit shop drawings per Section 26 05 00 for review including the following:

1. Receptacles
2. Switches
3. Wiring devices
4. Accessories

PART 2 - PRODUCTS

2.1 RECEPTACLES

A. Wiring devices shall be UL listed and suitable for the application.

B. Devices shall be color coded per the system to which they are connected: normal power shall be white; emergency power shall be red; dedicated outlets shall be grey; unless otherwise noted on the construction documents.

C. Receptacles shall be heavy duty, screw type, side wired, 120V, 20A, duplex type, unless noted otherwise on the construction documents. Verify NEMA configuration with construction documents.

D. Weathertight receptacles shall be gasketed in cast metal boxes with cast metal coverplates. Coverplates shall have spring-loaded in-use hinged covers.

E. Ground fault interrupting receptacles shall be duplex type and capable of detecting a leaking current of 5mA.

F. Provide Hubbell ‘HBL 5362’ or equal.

G. For decorator type, provide Hubbell Type DR 20DR or DR20TR for tamper proof.

H. All receptacles in public areas shall be tamper-proof. Provide Hubbell ‘HBL 8300SGA’

2.2 TOGGLE SWITCHES

A. Toggle wall switches shall be quiet AC type, rated 120/277V, 20A and UL listed for the application.

B. Switches shall be single pole, double throw with white finish unless noted otherwise.

C. Provide Hubbell ‘HBL 1221’ or equal

D. For decorator type, provide Hubbell Type DS 120-20amp

2.3 WALL BOX DIMMERS

A. Wall box dimmers shall be UL listed and suitable for the application.

B. Devices shall be white unless otherwise noted.

C. Device shall be noted for minimum 1000W, unless otherwise noted.

D. Device shall be available in single-pole and 3-way configurations.

E. Device shall be Leviton 'Touch Point' series, or equal by Lutron.

2.4 COVERPLATES

A. Single, combination coverplates shall be used at all ganged device locations.

B. Provide white plastic coverplates with white screws in all office areas. Provide stainless steel coverplates with matching screws in janitorial, mechanical, laboratory, process, manufacturing, and clean room areas or as noted on the construction documents. Provide weatherproof in-use covers for all exterior locations.

C. Provide labeled plates as noted on the construction documents.

D. Provide labeled plates at all receptacles with circuit and panel designation. Labeling method shall utilize clear adhesive printed labels with black bold letters.

2.5 ACCEPTABLE MANUFACTURERS

A. Acceptable manufacturers shall be Arrow Hart, Hubbell, Leviton, or Pass and Seymour.

PART 3 - EXECUTION

3.1 Installation method of wiring devices shall comply with the latest enforced edition of the National Electrical Code and the authority having jurisdiction.

3.2 Installation of receptacles in dwelling unit bedrooms shall comply with NEC section 210-12(b) and shall be protected by an arc fault circuit interrupter.

3.3 Install all devices in accordance with the manufacturer's recommendations and requirements.

3.4 Contractor shall verify installation orientation of duplex outlets (ground pin up or down) with Owner's representative prior to installation.

3.5 Coordinate device mounting height, location and type with architectural and interior drawings. Coordinate with other trades to identify conflicts with device locations and notify the Engineer of any conflicts.

3.6 Install devices only in clean boxes.

3.7 Install all trim rings and coverplates in coordination with other trades and their installation schedules.

3.8 Tighten and inspect all connections prior to covering devices and reconnect or repair wiring as necessary.

3.9 Test all devices for voltage level, continuity, ground fault, and short circuits.

3.10 Install all devices plumb and square to structure and adjacent surfaces.

3.11 Connect and inspect all ground bonds prior to covering device.

3.12 Demonstrate the proper operation of all ground fault interrupting devices.

END OF SECTION 26 27 26

SECTION 26 28 16 - CIRCUIT AND MOTOR DISCONNECTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general conditions, Division 1, and Basic Electrical Requirements (Section 26 05 00) are part of this section and the contract for this work and apply to this section as fully as if repeated herein.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 QUALITY ASSURANCE AND STANDARDS

A. All work, material or equipment shall comply with the codes, ordinances and regulations of the local government having jurisdiction, including the regulations of serving utilities and any participating government agencies having jurisdiction.

B. All electrical work shall comply with the latest edition under enforcement including all amendments, modifications, and supplements of the following codes and standards or other regulations which may apply:

1. American Disabilities Act (ADA)
2. American National Standards Institute (ANSI)
3. American Society for Testing and Materials (ASTM)
4. Institute of Cable Engineers Association (ICEA)
5. Institute of Electrical and Electronic Engineers (IEEE)
6. Local Code Enforcement Agency Requirements
7. National Electrical Code (NEC)
8. National Electrical Contractor's Association (NECA)
9. National Electrical Manufacturer's Association (NEMA)
10. National Electrical Testing Association (NETA)
11. National Fire Protection Association (NFPA)
12. Underwriter's Laboratories, Inc. (UL)
13. International Building Code(IBC)

No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. Any conflicts or changes required to the contract documents in order to obtain compliance with applicable codes shall be brought to the immediate attention of the Engineer, Architect and Owner's Representative by the contractor.

C. All items shall be listed by Underwriter's Laboratories and shall bear the UL label.

D. Equipment shown to scale is approximate only and based upon a general class of equipment specified. The Contractor shall verify all dimensions and clearances prior to commencement of work.

E. The Contractor shall verify all points of connection with the manufacturer's requirements, instructions, or recommendations prior to installation. The actual dimensions, weights, clearance requirements and installation requirements shall be verified and coordinated by the

contractor.

1.3 SUBMITTALS

A. Submit shop drawings per Section 26 05 00 for review including the following:

1. Voltage and current ratings
2. NEMA enclosure type
3. Horsepower and fault current rating
4. Dimensions
5. Fuse type and class

PART 2 - PRODUCTS

2.1 Disconnects shall NEMA 1, indoor type, or rated for the locations in which they are installed as noted on the construction documents.

2.2 Disconnects shall be UL listed and suitable for the application.

2.3 Disconnects in exterior, wet, cold, warm, or hot environments shall be raintight, have raintight hubs, and be rated NEMA 3R.

2.4 Disconnects shall be heavy-duty type, rated 600V with current capacity as noted on the construction documents. Verify NEMA configuration with construction documents.

2.5 Disconnects shall have hinged, lockable, dead-front doors with permanently marked ON/OFF indicators. Enclosures shall be baked enamel factory painted steel with conduit knockouts.

2.6 Disconnects shall be operated by a handle accessible from the exterior of the enclosure. Handles shall have provision to be padlocked in the OFF position.

2.7 All current carrying parts shall be high conductivity copper designed to carry rated load without damage from heat and plated to resist corrosion.

2.8 Switch mechanism shall be a quick-make, quick-break type such that the operation of the contact is restrained by the handle during the closing or opening operation.

2.9 Switches shall have a minimum fault current rating of 200,000A RMS.

2.10 All switches shall be fused unless specifically noted otherwise.

2.11 The disconnect door cover shall have an interlocking mechanism to prevent opening the cover when the switch is in the ON position.

2.12 Fuses serving motor loads shall be Class L and Class RK1, 250V and 600V, time delay, dual element unless noted otherwise on the construction documents.

2.13 Fuses serving non-motor loads shall be Class L and Class RK1, 250V and 600V, fast acting, dual element unless noted otherwise on the construction documents.

2.14 Provide built-in fuse pullers.

2.15 Acceptable manufacturers shall be General Electric, Siemens, Eaton, or Square D. Fuses shall be Gould-Shawmut or Bussman. Provide spare fuses in the amount of ten percent of each size

and type installed, but not less than three; delivered to the Owner upon final acceptance of the project. Provide and install fuse cabinet in the electrical room for storing these extra fuses.

2.16 Where current limiting fuses are indicated, provide switches with non-interchangeable feature suitable only for current limiting type fuses. Each fusible disconnect switch will be equipped with a blown fuse indicator module.

PART 3 - EXECUTION

3.1 Installation method of disconnects shall comply with the latest enforced edition of the National Electrical Code and the authority having jurisdiction.

3.2 Install all disconnects in accordance with the manufacturer's recommendations and requirements.

3.3 Coordinate disconnect mounting height, location and type with architectural, mechanical, and interior drawings. Coordinate with other trades to identify conflicts with device locations and notify the Engineer of any conflicts. Mount switches 42" above finished floor unless noted otherwise.

3.4 Provide suitable galvanized metal strut framework where no wall or structure is available for the mounting of disconnects.

3.5 Provide flexible conduit connections for disconnects mounted to strut framework, motors, or vibrating equipment.

3.6 Tighten and inspect all connections and reconnect or repair wiring as necessary.

3.7 Test all disconnects for voltage level, continuity, ground fault, and short circuits. Check switch mechanism operation under no load conditions prior to operating under load.

3.8 Install all disconnects plumb and square to structure and adjacent surfaces.

3.9 Provide and install all fuses sized per the equipment manufacturer's recommendation.

END OF SECTION 26 28 16

SECTION 26 51 00 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general conditions, Division 1, and Basic Electrical Requirements (Section 26 05 00) are part of this section and the contract for this work and apply to this section as fully as if repeated herein.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 SCOPE

A. Provide labor, materials, tools, and equipment necessary for and incidental to performing all operations in connection with furnishing, delivery and installation of the equipment of this section, as shown on the drawings and specified herein.

B. Furnish and install complete lighting systems, wired, assembled and operable, except where specifically noted otherwise, which includes but not limited to the following:

1. Luminaires
2. Lamps and ballasts
3. Mounting hardware
4. Accessories as noted

C. The materials and equipment herein specified shall be of new and furnished in accordance with the applicable standards.

D. Specifications and drawings are intended to convey the general features, function and character of the fixtures only, and do not illustrate or set forth every item or detail necessary of the work.

1.3 QUALITY ASSURANCE AND STANDARDS

A. The latest revision of the standards listed below form an integral part of this specification:

1. American Disabilities Act (ADA)

2. American National Standards Institute (ANSI)
3. American Society for Testing and Materials (ASTM)
4. Institute of Cable Engineers Association (ICEA)
5. Institute of Electrical and Electronic Engineers (IEEE)
6. Local Code Enforcement Agency Requirements
7. National Electrical Code (NEC)
8. National Electrical Contractors Association (NECA)
9. National Electrical Manufacturer's Association (NEMA)
10. National Electrical Testing Association (NETA)
11. National Fire Protection Association (NFPA)
12. Underwriters' Laboratories, Inc. (UL)
13. International Building Code (IBC)

14. Illuminating Engineering Society of North America (IESNA)
15. Certified Ballast Manufacturers (CBM)
16. National Appliance Energy Conservation Amendments of 1988 (Public Law 100-357).

Materials and equipment as well as workmanship provided under this section shall conform to the highest commercial standards, and as specified and as indicated on the drawings. Fixture parts and components not specifically identified or indicated shall be made of materials most appropriate to their use or function and as such resistant to corrosion, thermal and mechanical stresses encountered in the normal application and function of the fixtures.

1.4 SUBMITTALS

A. Shop drawings for all fixtures shall be submitted and reviewed prior to fabrication. Any material produced prior to the review of shop drawings or samples, and not in conformance with the Contract Documents, shall be rejected with the Contractor bearing full responsibility and cost. Submit shop drawings per Section 26 05 00 for review, include the following:

1. Luminaires
2. Lamps
3. Ballasts
4. Photometric reports
5. Point-by-point calculations specific to the project.
6. Accessories

B. Submit shop drawings indexed, and in accordance with luminaire identification per drawings. Each item shall be tabbed, clearly identifying the catalog ordering numbers including all optional equipment specified.

C. Luminaire shop drawings shall include the following:

1. Manufacturers' product information sheets. Photocopy of partial data sheet or drawings is not acceptable. Product information shall include the following:

   a. Ballast type, manufacturer and performance characteristics
   b. Lamp type, manufacturer and performance characteristics
   c. Finish, frame, trim and housing type
   d. Reflector system and characteristics
   e. Diffuser type and characteristics
   f. Weight and dimensions
   g. Standard manufacturer options
   h. Luminaire series and model number
   i. Luminaire efficiency
   j. Coefficient of utilization
   k. Candlepower data table
   l. Zonal lumens table
   m. IES luminaire classification
   n. Maintenance and operating instructions including tools required, types of cleaners to be used and suggested replacement parts list.
   o. Average foot candle table.

2. Photometric data assembled in a standard IES photometric test report.

D. Lamp shop drawings shall include type, dimensions, manufacturer and operating characteristics, including but not limited to:

1. Operating voltage range

2. Color Rendering Index (CRI) value per IES standards
3. Color temperature (in Kelvin)
4. Mounting position
5. Starting temperature, indoor and outdoor
6. Starting/restrike time
7. Lamp life
8. Lamp efficiency
9. Warranty
10. Lamp base
11. Lumen rating

E. Ballast shop drawings shall include type, dimensions, manufacturer and operating characteristic including but not limited to:

1. Ballast operating temperature and voltage
2. Total harmonic distortion
3. Ballast starting/restrike time
4. Ballast efficiency factor (BEF)
5. Ballast transformation type (ie: autotransformer, preheat, instant-start, rapid start, constant wattage, reactor, trigger-start)
6. UL classification (ie: Class "P")
7. Power factor
8. Sound rating (fluorescent only)
9. NEMA rating

F. If requested by the Engineer, samples shall be submitted for final selection. Samples shall comply with the following:

1. Paint chips:

    a. Samples shall be provided and approved prior to any release to manufacture.
    b. Samples shall be minimum of 3"x3" and be of exact finishes.
    c. Samples shall be exact representatives of the luminaires:

        1) Priming process
        2) Painting process
        3) Baking process
        4) Finish process
        5) Luminaire material (i.e. sheet metal, aluminum, wood, etc)

    d. Samples shall be labeled with manufacturers color call-out, as well as the paint manufacturers' call-out.

2. Fixtures:

    a. Submit for approval samples called for to the Engineer when and where directed, the components marked with the name of the project, and fixture type, and part number. Fixture shall be provided with a 6' cord and plug, and specified lamp. Allow two weeks from the date of receipt for thorough examination and review by the Engineer.
    b. Fixtures under the contract shall be identical with the approved sample fixture. No fixture used as a sample shall be allowed to be installed on the project.
    c. In the event the submissions are disapproved, the fixtures shall be returned to the contractor to immediately make a new submission of fixture or fixtures meeting the contract requirements.
    d. All charges for these shipments are to be prepaid by the Contractor.
    e. Samples shall be provided and approved prior to any release to manufacture.

1.5 FACTORY TESTING

A. Luminaire testing shall be conducted by an approved independent testing laboratory.

B. Luminaire tests shall be reported in accordance with Illuminating Engineering Society (IES) Standard Photometric Test Report.

1.6 WARRANTY

A. Contractor shall warranty equipment and installation free from defects in material and workmanship for a period of no less than (1) year from the date of project completion. This includes the fixture, its finishes and components (see ballasts below).

B. Fluorescent ballasts shall be warrenteed against defects in material and workmanship for a period of no less than (5) years for electronic ballasts, from the date of project completion regardless of the date of manufacture.

C. HID ballasts shall be warranteed against defects in material and workmanship for a period of no less than (2) years from the date of project completion regardless of the date of manufacture.

D. LED modules and drivers shall each be warrantied against defects in material and workmanship for a period of no less than five (5) years, form the date of project completion regardless of the date of manufacture.

PART 2 - PRODUCTS

2.1 GENERAL

A. Luminaries shall bear the appropriate UL label for location, mounting position and operating conditions in which it is installed.

B. Luminaries, ballasts and lamps shall each be of the same manufacturer and of identical finish, appearance, and performance. Luminaries which are pre-lamped before shipment shall have identical lamp manufacturer. Mix and match of different lamp manufacturer shall not be acceptable.

C. Recessed ceiling mounted luminaires shall be provided with appropriate frame and trim type compatible with ceiling construction. Reference architectural plans for ceiling construction type and specifications.

D. Luminaires and devices shall be free of burrs, scratches, marks, and dents which may occur during transportation, storage or installation. Construction shall be finished to eliminate sharp edges exposed to installer and end-user.

E. Sheet metal construction of luminaires shall be of sufficient rigidity to prevent deformation during installation and typical use.

F. Cast parts and sections of a luminaire shall be smooth, free of blemishes, rust and scale and be irradiated, sandblasted and anodized.

G. All burned out lamps and ballasts shall be replaced by the end of contract prior to Architect, Owner Representative and Engineer final punchlist.

H. Trim color for indoor luminaire installation shall be as indicated on plans.

I. Enamel paint shall be baked on at a minimum 300 degrees F and have 86% reflectivity for a surface, which is to be reflective.

J. All exit signs shall be illuminated by integral LED and provided with universal voltage (120V and 277V). Backup batteries must have a useful life of 3-5 years or greater,

2.2 LAMPS

A. Incandescent lamps

1. Incandescent lamps below 300W shall be medium base type unless otherwise noted.
2. Incandescent lamps shall be frosted inside or as manufacturer recommended and 130V rated unless otherwise noted.
3. Low Voltage lamps MR16 shall be NFL unless otherwise noted.

B. LED (Lighting Emitting Diode) Modules

1. Unless specified on plans or in Lighting Fixture Schedule, the module color temperature shall be 3500 Kelvin (K).
2. Unless otherwise noted, modules shall have a CRI (color rendering index) of 82 or greater.
3. Rated lumen output shall be based on fixture absolute lumens as defined in LM-79 (IESNA).
4. Modules shall comply with LM-80 (IESNA).
5. LED modules shall be interchangeable without removal or replacement of heat sink or luminaire.
6. Luminaire Manufacturer to offer replacement modules that maintain rated lumen package per initial design luminaire.
7. Minimum rated life of modules shall be 50,000 hours per IESNA L70.

C. Acceptable Manufacturers

1. Halogen Lamps: Osram/Sylvania, GE or Philips.
2. LED Chips: Cree, Nichia, Philips or approved equal.

D. Fluorescent lamps

1. Unless specified on plans or in Lighting Fixture Schedule, the lamp color temperature shall be 3500 Kelvin (K).
2. Unless otherwise noted, lamps shall have a CRI (color rendering index) of 82 or greater.

E. HID lamps

1. Metal halide lamps shall be phosphor coated and universal burning position type unless otherwise noted. Metal halide lamps shall incorporate a quartz shroud around the arc tube to prevent outer jacket rupture in the event of a non-passive arc tube failure.
2. Metal halide lamps shall be of the type with a lifetime color stability within +/-200K. If not available for the type and wattage specified, metal halide lamps with the best color uniformity as per current industry standards shall be used.
3. High Pressure Sodium lamps shall be diffuse coated and universal burning position type unless otherwise noted.

F. Compact Fluorescent

1. Unless specified on plans or in Lighting Fixture Schedule, the lamp color temperature shall be 3500 Kelvin (K).

2. Unless otherwise noted, lamps shall have a CRI (color rendering index) of 82 or greater.
3. Lamp base and fixture socket shall match pin configuration.

G. Acceptable manufacturers

1. Incandescent Lamps: Osram/Sylvania, GE or Philips
2. Fluorescent Lamps: Osram/Sylvania, 800 XP series
3. Low Pressure Sodium Lamps: Osram/Sylvania or Philips
4. Metal Halide Lamps: Osram/Sylvania, GE or Philips
5. High Pressure Sodium Lamps: Osram/Sylvania, GE or Philips

H. All lamps shall be burned once installed in the fixtures for 100 hours, prior to switching or dimming.

2.3 BALLASTS

A. General

1. Ballasts shall be UL listed when installed in luminaire.
2. Ballasts shall be grounded appropriately as governed by NEC Article 410-E.
3. Ballasts shall be located within the luminaire for which it is operating unless specifically indicated on plans as remote ballast type.
4. Ballasts shall contain no PCB's in any indoor or outdoor installation unless otherwise noted.
5. Ballasts shall be rated weatherproof type where there is moisture present.
6. A permanent waterproof seal shall be factory provided where the wiring enters the ballast compartment of an outdoor luminaire installation.

B. LED Drivers

1. Shall be UL listed when installed in luminaire.
2. Drivers shall be grounded appropriately as governed by NEC Article 410-E.
3. Drivers shall be located within the luminaire for which it is operating unless specifically indicated on plans as remote ballast type.
4. Remote drivers shall be located in accessible location, within manufacturers maximum distance requirements.
5. Drivers shall be rated weatherproof type where there is moisture present.
6. A permanent waterproof seal shall be factory provided where the wiring enters the ballast compartment of an outdoor luminaire installation.
7. Drivers shall have a standard dimming protocol of 0-10V unless otherwise noted on the Luminaire Schedule.
8. Shall operate with no detectable flicker and be high power factor (95% or higher.
9. Drivers shall be marked with the manufacturer’s name, part number, supply voltage, power factor, open circuit voltage, current draw for each LED module being powered and bear all applicable UL listing on housing.
10. All drivers shall be compatible with dimming protocol of connected room controllers, panels, local controls, devices and other luminaires.

C. Acceptable Manufacturers

1. Osram/Sylvania, GE, Philips or EldoLED.

D. Fluorescent ballasts

1. Solid State Ballasts (Electronic)

a. Electronic ballasts shall meet or exceed ANSI, IEEE, and FCC standards for lamp

starting and operation, electromagnetic interference, radio frequency interference suppression and line transient protection.

b. Electronic ballasts shall not interfere with other electrical equipment normal operation.
c. Electronic ballasts shall operate at a frequency of 20 to 35kHz with no detectable flicker and be high power factor (97% or higher).
d. Electronic ballasts that operate more than one lamp shall be able to maintain full output of the companion lamp(s) after failure of any combination of lamp(s).
e. Electronic ballasts shall not be affected by lamp failure nor hinder the normal life of operating lamp.
f. Electronic ballast normal case operating temperature shall not exceed 70 degrees C.
g. Rapid-start electronic ballasts shall provide soft/stable start of rapid-start lamps and maintain full cathode heat during operation.
h. Electronic ballasts shall be marked with manufacturer's name, part number, supply voltage, power factor, open circuit voltage, current draw for each lamp type and bear all applicable UL listings on housing.

E. HID Ballasts

1. Autoregulator type with current crest factor of 1.6 to 1.8 and voltage regulation of 10% allowable.
2. Metal halide ballasts shall be Lead-Peak Autotransformer type with current crest factor of 1.6 to 1.8 and voltage regulation of 10% allowable.
3. High pressure sodium ballasts shall be Regulating type with voltage regulation of 10% allowable and shall meet ANSI trapezoid limitations for voltage characteristics over the life of the lamp.
4. HID ballasts shall be fused with manufacturer recommended size and type
5. HID ballasts shall bear all applicable UL listings on housing.

F. Acceptable Manufacturers

1. Solid state ballasts (electronic): Osram Sylvania or, Quicktronic, or approved equal.
2. Low-pressure sodium ballasts: Magnetek, Advance Transformer Co. or approved equal.
3. Metal halide ballasts: Magnetek, Advance Transformer Co. or approved equal.
4. High pressure sodium ballasts: Magnetek, Advance Transformer Co. or approved equal.

2.4 LUMINAIRES

A. General

1. Escutcheon plates, coverplates, and finish trim hardware shall meet flush with ceiling, floor, wall or other surfaces to which they may be mounted.
2. Luminaire construction shall allow initial installation of recessed luminaires without the presence of finish trim, diffusers or lens.
3. Lamp sockets and reflector assemblies shall be securely fastened to luminaire housing to prevent rotation, adjustment or rocking of hardware during lamping or future relamping.
4. Luminaire lenses shall be securely retained in a fashion so that relamping or accessing to luminaire will not dislodge lens.
5. Luminaire lenses and diffusers shall be free from chromatic or spherical imperfections and have thermal characteristics capable of withstanding installed lamp temperatures.
6. Pendant type luminaries shall be mounted to provide balanced construction with the use of swivel hanger. Swivel hanger shall be provided standard or ordered as accessory unless specified otherwise.
7. Bracket type luminaires shall be specifically designed for type installation which is indicated.
8. Luminaries shall be factory tested, prewired and preassembled unless otherwise

specified or intended.

9. Luminaires located in direct exposure to the weather to include rain, sleet and snow shall be marked "Suitable For Wet Locations" with UL label. Luminaires located outdoors but not in direct exposure to rain shall be marked "Suitable for Damp Locations" minimum rated.
10. Where ceiling space is not accessible, luminaire housing shall provide access to luminaire junction box to comply with NEC section 370-29.
11. Luminaires shall contain an integral ballast disconnect compliant with NEC section 410.73.

B. Incandescent Luminaires

1. Recessed incandescent luminaires shall be provided with mounting frame and attached prewired junction box rated for through-wiring with 60 degree C conductors.

C. LED Luminaires

1. Luminaires shall come with manufacturer provided LED module installed.
2. All luminaires shall meet building energy code Title 24-2013 efficacy requirements.
3. Luminaire housing, driver and module shall be products of the same manufacturer.

D. Fluorescent Luminaires

1. Recessed fluorescent luminaires shall be constructed to limit ballast housing surface temperature in luminaire to 90°C with the following factors:

    a. Voltage: 277V +5%
    b. Room Ambient Temp: 25 degrees C + 5%
    c. Plenum Ambient Temp: 55 degrees C +5%
    d. Ceiling Material R Factor: 20

2. Medium BiPin type lamp socket shall be fastened securely to housing via brackets or straps to eliminate excessive flexing or pressure during normal lamp installation. Socket should be replaceable without removing entire housing.
3. Medium BiPin type lamp sockets without a housing shall be secured with (2) appropriate screws or bolts to prevent misalignment.
4. Fluorescent pin type sockets shall utilize corrosion-resistant "edge-wipe" type contacts.
5. Steel metal fluorescent luminaire housing shall be constructed of die formed, heavy duty, cold rolled steel. Housing shall be welded using lab seam construction and corners mitered and free of burrs, cracks, gouges, scratches.
6. Aluminum fluorescent luminaire housing shall be extruded or die formed in sections, which will positively interconnect to provide a rigid unit when assembled.
7. Steel metal construction of fluorescent luminaires housing shall be ribbed, section or paneled to provide internal structure.
8. Parabolic baffle optic control for fluorescent luminaires shall be semi-specular anodized, of low iridescent and constructed of sheet aluminum. Baffle shall be constructed to ensure rigidity and parabolic contours through interlocking cell assembly.
9. Prismatic lenses shall be of virgin acrylic plastic pattern 12 (0.125 inches thick prestressed to span 48-inches) unless specified otherwise on plans.
10. Compact fluorescent luminaire shall incorporate an End of Life (EOL) protection device.

E. HID Luminaires

1. HID luminaries shall be provided with porcelain, screw type mogul sockets UL listed for 1500W or higher at 600 volts where applicable.
2. High pressure sodium luminaries shall operate ballasts and lamps with lamp in open and short circuit conditions for 6 months without significant ballast life loss.
3. High pressure sodium luminaries shall operate within 2% of their labeled wattage with a

10% variance of input rated voltage. Power factor shall maintain minimum of 85% through life.

F. Self-Illuminance Luminaires

1. Self-illuminating luminaries shall have passed ANSI 540 tests of structural integrity by an approved testing agency.
2. Manufacturer of supplied luminaries shall keep record of installation and number of luminaries and type installed.
3. In the event of specified end of code life, the manufacture shall contact and inform the Owner of the expiration date.
4. In the event of demolition, improvements, or permanent removal of luminaire, the manufacture shall be accessible for proper disposal as indicated by OSHA, NFPA, NRC, and other governing authorities at no cost to the owner or future owners.

G. Emergency Lighting Units

1. 90 minute internal battery packs
2. IBC/Life safety approved

H. Acceptable manufacturers shall be as specified on plans per Lighting Fixtures Schedule unless otherwise specified herein or on plans.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Any discrepancies with specified luminaire and its proposed use or environment shall be brought to the Engineer's attention as soon as possible.

1. At project close-out, a list of damaged fixtures received by the contractor shall be provided to the Electrical Engineer for evaluation of fixture manufacturers shipping and packaging methods.

3.2 INSTALLATION

A. Luminaires shall be installed complete with all accessories, glassware, canopies, sockets, reflectors, optics, wiring devices and supplied with new lamps of the type and wattage indicated on plans or in this specification unless specifically noted otherwise.

B. All luminaires shall be supported in accordance with ASTM E-580 recommended guidelines for seismic restraint, as well as the latest version of the International Building Code related to lateral and vertical bracing, including but not limited to:

1. Recessed luminaires shall have a minimum of four (4) #10 gauge wires attached to structure above; (1) wire at each corner of the luminaire. The wires shall be independent of ceiling support system.
2. All lighting fixtures shall be positively attached to the suspended ceiling system. The attachment device shall have a capacity of 100 percent of the lighting fixture weight acting in any direction.
3. Pendant-hung lighting fixtures shall be supported directly from the structure above with #9 gauge wire or approved alternate support without using the ceiling suspension system for direct support.

C. Mount luminaries in mechanical yards, areas and rooms to clear any mechanical equipment, conduit and clearances. Coordinate mounting with mechanical plans.

D. Junction box and ballast compartment shall be accessible from below when housing is installed in final position. Wiring shall be secured from damage when accessed for relamping.

E. Fire rated gypsum board enclosures shall be constructed around all recessed luminaires that penetrate fire rated areas.

F. All surface mounted luminaires installed on a suspended ceiling grid shall have four (4) supporting clips positively attaching corners of housing to the ceiling. Installation shall include 1/8" spacers between the housing and ceiling tile where applicable.

G. Actual locations of luminaires and dimensions shall be referenced to architectural drawings. Electrical plans shall not be used to scale for construction purposes. Any discrepancies shall be brought to the engineer's attention prior to installation.

H. Utilize modular wiring systems in the installation of luminaires where accessible and applicable. The system shall be complete with all required fittings, plugs, and cord drops for a complete operating system per specifications.

I. Provide additional junction boxes as required where conductor exceeds factory provided junction box limitations.

J. Installation shall be appropriately coordinated with all disciplines to insure proper ventilation and heat dissipation as required per manufacturer.

K. Where luminaires are served from two sources, a barrier shall be provided to separate emergency source from normal source with notation indicating separate sources.

L. Luminaires not utilizing modular wiring systems, shall be connected with minimum six (6) foot length of flexible metal conduit from a structurally mounted junction box.

M. Wall mounted luminaries and junction boxes shall be rigidly supported to structure to provide adequate support during normal operation.

N. Pendant luminaries shall be mounted in a uniform mounting height and in straight, parallel, continuous rows. Final coordination with the architectural reflected ceiling plan, mechanical equipment and plumbing fixtures shall be made in the field to ensure consistent spacing and locations.

O. All wall mounted fixtures shall be mounted to a supporting wall bracing material in addition to the junction box. The bracing material is secured to structural elements in the wall. The bracing shall be capable of supporting the weight of the fixture and comply with the manufacturer’s requirements and recommendations.

3.3 LABORATORY INSTALLATION

A. Luminaires mounted in a controlled environment such as a clean room shall be gasketed and sealed where the housing meets the ceiling with a continuous silicone-based resilient sealant bead.

B. Luminaires installed in a wet environment such as a wipe-down or hose-down laboratory shall bear the “Wet Location” UL listing and sealed waterproof with appropriate silicone based resilient sealant.

C. Ceiling openings installed in a sealed environment to insure accessibility to outlet boxes shall be gasketed to prevent any flow of air. The cover shall be constructed to ensure structural integrity for continuous removal from ceiling and be mounted with large head screws as required.

3.4 FIELD TESTING

A. Upon completion of installation, an operation test shall be conducted to show that all equipment operates in accordance with the requirement of this specification.

B. All applicable tests shall be conducted in the presence of an Owner Representative and copies of any reports shall be provided.

C. Reports shall indicate when and where the test was conducted and who was present.

D. Upon completion of installations, luminaires requiring positioning shall be adjusted and aimed at final position.

E. Exit signs shall be individually reviewed after installation completion to ensure directional arrows are properly provided and positioned.

3.5 CLEANING AND REPAIR

A. After complete lighting installation and before project completion, all damaged or faulty lenses or louvers in luminaires shall be replaced by the Electrical Contractor, at no additional cost to the Owner.

B. All anodized or highly visual or optically sensitive reflectors shall be cleaned of all fingerprints and smudges for a clean installation per manufacturers' recommendations.

C. All luminaries with paint scratches, dents or deformations due to installation or shipping shall be repaired, touched up or replaced as required or deemed necessary by the Electrical Engineer at no additional cost to the Owner.

D. Upon final installation of individual luminaires, dirt and debris shall be removed from luminaire enclosures.

END OF SECTION 26 51 00

SECTION 26 56 00 - EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general conditions, Division 1, and Basic Electrical Requirements (Section 26 05 00) are part of this section and the contract for this work and apply to this section as fully as if repeated herein.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 SCOPE

A. Provide labor, materials, tools, and equipment necessary for and incidental to performing all operations in connection with furnishing, delivery and installation of the equipment of this section, as shown on the drawings and specified herein.

B. Furnish and install complete lighting systems, wired, assembled and operable, except where specifically noted otherwise, which includes but not limited to the following:

1. Luminaires
2. Lamps and ballasts
3. Mounting hardware
4. Accessories as noted
5. Poles
6. Pole bases
7. Anchor bolts and templates
8. Spare lamps

C. The materials and equipment herein specified shall be of new and domestic manufacturer and furnished in accordance with the applicable standards.

D. Specifications and scale drawings are intended to convey the salient features, function and character of the fixtures only, and do not undertake to illustrate or set forth every item or detail necessary of the work.

1.3 QUALITY ASSURANCE AND STANDARDS

A. The latest revision of the standards listed below form an integral part of this specification:

1. American Disabilities Act (ADA)
2. American National Standards Institute (ANSI)
3. American Society for Testing and Materials (ASTM)
4. Institute of Cable Engineers Association (ICEA)
5. Institute of Electrical and Electronic Engineers (IEEE)
6. Local Code Enforcement Agency Requirements
7. National Electrical Code (NEC)
8. National Electrical Contractors Association (NECA)
9. National Electrical Manufacturer's Association (NEMA)

10. National Electrical Testing Association (NETA)
11. National Fire Protection Association (NFPA)
12. Underwriters' Laboratories, Inc. (UL)
13. International Building Code (IBC)
14. Illuminating Engineering Society (IESNA)
15. Certified Ballast Manufacturers (CBM)
16. National Appliance Energy Conservation Amendments of 1988 (Public Law 100-357).

Materials and equipment as well as workmanship provided under this section shall conform to the highest commercial standards, and as specified and as indicated on the drawings. Fixture parts and components not specifically identified or indicated shall be made of materials most appropriate to their use or function and as such resistant to corrosion, thermal and mechanical stresses encountered in the normal application and function of the fixtures.

1.4 SUBMITTALS

A. Shop drawings for all fixtures shall be submitted and approved before fabrication. Any material produced prior to the approval of shop drawings or samples, and not in conformance with the Contract Documents, shall be disapproved with the contractor bearing full responsibility and cost. Submit shop drawings per Section 26 05 00 for review, include the following:

1. Luminaires
2. Lamps
3. Ballasts
4. Drivers and Transformers
5. Photometric reports
6. Point-by-point calculations specific to the project.

B. Submit shop drawings indexed, and in accordance with luminaire identification per drawings. Each item shall be tabbed, clearly identifying the catalog ordering numbers including all optional equipment specified.

C. Luminaire shop drawings shall include the following:

1. Manufacturers report of current and original source. Photocopy of partial data sheet or drawings is not acceptable. Report shall include the following:

a. Ballast type, manufacturer and performance characteristics
b. Lamp type, manufacturer and performance characteristics
c. Finish
d. Reflector system and characteristics
e. Diffuser type and characteristics
f. Weight and dimensions
g. EPA rating
h. Standard manufacturer options
i. Luminaire series and model number
j. Luminaire efficiency
k. Candlepower data table
l. Zonal lumens table
m. IES luminaire classification
n. Maintenance and operating instructions including tools required, types of cleaners to be used and suggested replacement parts list.

2. Photometric data assembled in a standard IES photometric test report.

D. Lamp shop drawings shall include type, dimensions, manufacturer and operating

characteristics, including but not limited to:

1. Operating voltage range
2. Color Rendering Index (CRI) value per IES standards
3. Color temperature (in Kelvin)
4. Mounting position
5. Starting temperature, indoor and outdoor
6. Starting/restrike time
7. Lamp life
8. Lamp efficiency
9. Warranty
10. Lamp base
11. Lumen rating

E. Ballast shop drawings shall include type, dimensions, manufacturer and operating characteristic including but not limited to:

1. Ballast operating temperature voltage
2. Total harmonic distortion
3. Ballast starting/restrike time
4. Ballast efficiency factor (BEF)
5. Ballast transformation type (i.e.: autotransformer, preheat, instant-start, rapid start, constant wattage, reactor, trigger-start)
6. UL classification (i.e.: Class "P")
7. Power factor
8. Sound rating (fluorescent only)
9. NEMA rating

F. If requested by the Engineer, samples shall be submitted for final selection. Samples shall comply with the following:

1. Paint chips:

   a. Samples shall be provided and approved prior to any release to manufacture.
   b. Samples shall be minimum of 3"x3" and be of exact finishes.
   c. Samples shall be exact representatives of the luminaires:

      1) Priming process
      2) Painting process
      3) Baking process
      4) Finish process
      5) Luminaire material (i.e. sheet metal, aluminum, wood, etc.)

   d. Samples shall be labeled with manufacturers color call-out, as well as the paint manufacturers' call-out.

2. Fixtures:

   a. Submit for approval samples called for to the Engineer when and where directed, the components marked with the name of the project, and fixture type, and part number. Fixture shall be provided with a 6' cord and plug, and specified lamp. Allow two weeks from the date of receipt for thorough examination and review by the Engineer.
   b. Fixtures under the contract shall be identical with the approved sample fixture. No fixture used as a sample shall be allowed to be installed on the project.
   c. In the event the submissions are disapproved, the fixtures shall be returned to the contractor to immediately make a new submission of fixture or fixtures meeting the contract requirements.

d. All charges for these shipments are to be prepaid by the contractor.
e. Samples shall be provided and approved prior to any release to manufacture.

1.5 FACTORY TESTING

A. Luminaire testing shall be conducted by an approved independent testing laboratory.

B. Luminaire tests shall be reported in accordance with Illuminating Engineering Society (IES) Standard Photometric Test Report.

1.6 WARRANTY

A. Contractor shall warranty equipment and installation free from defects in material and workmanship for a period of no less than (1) year from the date of project completion. This includes the fixture, its finishes and components (see ballasts below).

B. Fluorescent ballasts shall be warranted against defects in material and workmanship for a period of no less than (5) years for electronic ballasts, from the date of project completion regardless of the date of manufacture.

C. HID ballasts shall be warranted against defects in material and workmanship for a period of no less than (2) years from the date of project completion regardless of the date of manufacture.

D. LED modules and drivers shall each be warrantied against defects in material and workmanship for a period of no less than five (5) years, from the date of project completion regardless of the date of manufacture.

PART 2 - PRODUCTS

2.1 GENERAL

A. Luminaires shall bear the appropriate UL label for location, mounting position and operating conditions in which it is installed.

B. Luminaires, ballasts and lamps shall each be of the same manufacturer and of identical finish, appearance, and performance. Luminaires which are pre-lamped before shipment shall have identical lamp manufacturer. Mix and match of different lamp manufacturer shall not be acceptable.

C. Recessed ceiling mounted luminaires shall be provided with appropriate frame and trim type compatible with ceiling construction. Reference architectural plans for ceiling construction type and specifications.

D. Luminaires and devices shall be free of burrs, scratches, marks, and dents which may occur during transportation, storage or installation. Construction shall be finished to eliminate sharp edges exposed to installer and end-user.

E. Sheet metal construction of luminaires shall be of sufficient rigidity to prevent deformation during installation and typical use.

F. Cast parts and sections of a luminaire shall be smooth, free of blemishes, rust and scale and be irradiated, sandblasted and anodized.

G. All burned out lamps and ballasts shall be replaced by the end of contract prior to Architect, Owner Representative and Engineer final punchlist.

H. Color shall be as indicated on plans.

I. Enamel paint shall be baked on at a minimum 300 degrees F and have 86% reflectivity for a surface, which is to be reflective.

J. Housings: Rigidly formed, weather and light tight enclosures that will not warp, sag, or deform in use.

K. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during relamping and when secured in operating position. Provide for door removal for cleaning or replacing lens. Arrange to disconnect ballast when door opens.

L. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and ultraviolet radiation.

M. Lenses and Refractors: Materials as indicated. Use heat and aging-resistant, resilient gaskets to seal and cushion lens and refractor in luminaire doors.

2.2 LAMPS

A. Incandescent lamps

1. Incandescent lamps below 300W shall be medium base type unless otherwise noted.
2. Incandescent lamps shall be frosted inside or as manufacturer recommended and 130V rated unless otherwise noted.
3. Low Voltage lamps MR16 shall be “NFL” unless otherwise noted.

B. LED (Lighting Emitting Diode) Modules

1. Unless specified on plans or in Lighting Fixture Schedule, the module color temperature shall be 4000 Kelvin (K).
2. Unless otherwise noted, modules shall have a CRI (color rendering index) of 80 or greater.
3. Return lumen output shall be based on fixture absolute lumens as defined in LM-79 (IESNA).
4. Modules shall comply with LM-80 (IESNA).
5. LED modules shall be interchangeable without removal or replacement of heat sink or luminaire.
6. Luminaire Manufacturer to offer replacement modules that maintain rated lumen package per initial design luminaire.
7. Minimum rated life of modules shall be 50,000 hours per IESNA L70.

C. Acceptable Manufacturers

1. LED Chips: Cree, Nichia, Philips or approved equel.

D. Fluorescent lamps

1. Unless specified on plans or in Lighting Fixture Schedule, the lamp color temperature shall be 3500 Kelvin (K).
2. Unless otherwise noted, lamps shall have a CRI (color rendering index) of 82 or greater.

E. HID lamps

1. Metal halide lamps shall be phosphor coated and universal burning position type unless otherwise noted. Metal halide lamps shall incorporate a quartz shroud around arc tube to prevent outer jacket rupture in the event of a non-passive arc tube failure.
2. Metal halide lamps shall be of the type with a lifetime color stability within +/- 200K. If not available for the type and wattage specified, metal halide lamps with the best color uniformity as per current industry standards shall be used.
3. High Pressure Sodium lamps shall be diffuse coated and universal burning position type unless otherwise noted.

F. Compact Fluorescent

1. Unless specified on plans or in Lighting Fixture Schedule, the lamp color temperature shall be 3500 Kelvin (K).
2. Unless otherwise noted, lamps shall have a CRI (color rendering index) of 82 or greater.
3. Lamp base and fixture socket shall match pin configuration.

G. Acceptable manufacturers

1. Incandescent Lamps: Osram/Sylvania, GE or Philips
2. Fluorescent Lamps: Osram/Sylvania, 800 XP series
3. Low Pressure Sodium Lamps: Osram/Sylvania or Philips
4. Metal Halide Lamps: Osram/Sylvania, GE or Philips
5. High Pressure Sodium Lamps: Osram/Sylvania, GE or Philips

H. All lamps shall be burned once installed in the fixtures for 100 hours, prior to switching.

2.3 BALLASTS

A. General

1. Ballasts shall be UL listed when installed in luminaire.
2. Ballasts shall be grounded appropriately as governed by NEC Article 410-E.
3. Ballasts shall be located within the luminaire for which it is operating unless specifically indicated on plans as remote ballast type.
4. Ballasts shall contain no PCB's in any indoor or outdoor installation unless otherwise noted.
5. Ballasts shall be rated weatherproof type where there is moisture present.
6. A permanent waterproof seal shall be factory provided where the wiring enters the ballast compartment of an outdoor luminaire installation.

B. LED Drivers

1. Shall be UL listed when installed in luminaire.
2. Drivers shall be grounded appropriately as governed by NEC Article 410-E.
3. Drivers shall be located within the luminaire for which it is operating unless specifically indicated on plans as remove ballast type.
4. Remote drivers shall be located in accessible location, within manufacturers maximum distance requirements.
5. Drivers shall be rated weatherproof type where there is moisture present.
6. A permanent weatherproof seal shall be factory provided where the wiring enters the ballast compartment of an outdoor luminaire installation.
7. Drivers shall have a standard dimming protocol of 0-10V unless otherwise noted on the Luminaire Schedule.
8. Shall operate with no detectable flicker and be high power factor (95% or higher).
9. Drivers shall be marked with the manufacturer’s name, part number, supply voltage,

power factor, open circuit voltage, current draw for each LED module being powered and bear all applicable UL listing on housing.

10. All drivers shall be compatible with dimming protocol of connected room controllers, panels, local controls, devices and other luminaires.

C. Acceptable Manufacturers

1. Osram/Sylvania, GE, Philips or EldoLED.

D. Electromagnetic Ballasts

1. Electromagnetic "standard" ballast shall comply with the "National Appliance Conservation Amendment of 1988" (Public Law 100-357) Ballast Efficiency Factor (BEF) as enforced by the Certified Ballast Manufactures (CBM) for "high efficiency" ballast design standards.
2. Electromagnetic ballasts shall be sound "A" rated per NEMA standards.
3. Electromagnetic ballasts shall comply with NEC standards for thermal protection and shall be UL listed and marked "Class P".
4. Electromagnetic ballasts shall be listed by California Energy Commission's Energy Efficiency Standards of approved ballast manufacturers.
5. Electromagnetic ballasts indicated to be high power factor (HPF) shall be rated 90% (P.F.) minimum unless otherwise noted.

E. Solid State Ballasts (Electronic)

1. Electronic ballasts shall meet or exceed ANSI, IEEE, and FCC standards for lamp starting and operation, electro-magnetic interference, radio frequency interference suppression and line transient protection.
2. Electronic ballasts shall not interfere with other electrical equipment normal operation.
3. Electronic ballasts shall operate at a frequency of 20 to 35 kHz with no detectable flicker and be high power factor (97% or higher).
4. Electronic ballasts that operate more than one lamp shall be able to maintain full output of the companion lamp(s) after failure of any combination of lamp(s).
5. Electronic ballasts shall not be affected by lamp failure nor hinder the normal life of operating lamp.
6. Electronic ballast normal case operating temperature shall not exceed 70 degree C.
7. Rapid-start electronic ballasts shall provide soft/stable start of rapid-start lamps and maintain full cathode heat during operation.
8. Electronic ballasts shall be marked with manufacturer's name, part number, supply voltage, power factor, open circuit voltage, current draw for each lamp type and bear all applicable UL listings on housing.

F. Low-Pressure Sodium Ballasts

1. Low-pressure sodium ballasts shall bear all applicable UL listings on housing.
2. Low-pressure sodium ballasts shall be auto-leakage transformer type.

G. HID Ballasts

1. Metal halide ballasts shall be Lead-Peak Autotransformer type with current crest factor of 1.6 to 1.8 and voltage regulation of 10% allowable.
2. High pressure sodium ballasts shall be Regulating type with voltage regulation of 10% allowable and shall meet ANSI trapezoid limitations for voltage characteristics over the life of the lamp.
3. HID ballasts shall be fused with manufacturer recommended size and type.
4. HID ballasts shall bear all applicable UL listings on housing.

H. Acceptable Manufacturers

1. Solid state ballasts (electronic): Osram Sylvania or “Quicktronic”.
2. Low-pressure sodium ballasts: Magnetek, Advance Transformer Co. or approved equal.
3. Metal halide ballasts: Magnetek, Advance Transformer Co. or approved equal.
4. High-pressure sodium ballasts: Magnetek, Advance Transformer Co. or approved equal.

2.4 LUMINAIRES

A. General

1. Escutcheon plates, coverplates, and finish trim hardware shall meet flush with ceiling, floor, wall or other surfaces to which they may be mounted.
2. Luminaire construction shall allow initial installation of recessed luminaires without the presence of finish trim, diffusers or lens.
3. Lamp sockets and reflector assemblies shall be securely fastened to luminaire housing to prevent rotation, adjustment or rocking of hardware during lamping or future relamping.
4. Luminaire lenses shall be securely retained in a fashion so that relamping or accessing to luminaire will not dislodge lens.
5. Luminaires lenses and diffusers shall be free from chromatic or spherical imperfections and have thermal characteristics capable of withstanding installed lamp temperatures.
6. Pendant type luminaires shall be mounted to provide balanced construction with the use of swivel hanger. Swivel hanger shall be provided standard or ordered as accessory unless specified otherwise.
7. Bracket type luminaires shall be specifically designed for type installation which is indicated.
8. Luminaires shall be factory tested, prewired and preassembled unless otherwise specified or intended.
9. Luminaires located in direct exposure to the weather to include rain, sleet and snow shall be marked "Suitable For Wet Locations" with UL label. Luminaires located outdoors but not in direct exposure to rain shall be market "Suitable for Damp Locations" minimum rated.
10. Where ceiling space is not accessible, luminaire housing shall provide access to luminaire junction box to comply with NEC section 370-29.
11. Luminaires shall contain an integral ballast disconnect compliant with NEC section 410.73.

B. Incandescent Luminaires

1. Recessed incandescent luminaires shall be provided with mounting frame and attached prewired junction box rated for through-wiring with 60 degree C conductors.

C. LED Luminaires

1. Luminaires shall come with manufacturer provided LED module installed.
2. All luminaires shall meet building energy code Title 24-2013 efficacy requirements.
3. Luminaire housing, driver and module shall be products of the same manufacturer.
4. IES files shall include BIG ratings of fixture for each distribution and configuration.

D. Fluorescent Luminaires

1. Recessed fluorescent luminaires shall be constructed to limit ballast housing surface temperature in luminaire to 90 degrees C with the following factors:

    a. Voltage: 277V +5%
    b. Room Ambient Temp: 25 degrees C + 5%
    c. Plenum Ambient Temp: 55 degrees C +5%
    d. Ceiling Material R Factor: 20

2. Medium BiPin type lamp socket shall be fastened securely to housing via brackets or straps to eliminate excessive flexing or pressure during normal lamp installation. Socket should be replaceable without removing entire housing.
3. Medium BiPin type lamp sockets without a housing shall be secured with (2) appropriate screws or bolts to prevent misalignment.
4. Fluorescent pin type sockets shall utilize corrosion-resistant "edge-wipe" type contacts.
5. Steel metal fluorescent luminaire housing shall be constructed of die formed, heavy duty, cold rolled steel. Housing shall be welded using lab seam construction and corners mitered and free of burrs, cracks, gouges, scratches.
6. Aluminum fluorescent luminaire housing shall be extruded or die formed in sections, which will positively interconnect to provide a rigid unit when assembled.
7. Steel metal construction of fluorescent luminaires housing shall be ribbed, section or paneled to provide internal structure.
8. Parabolic baffle optic control for fluorescent luminaires shall be semi-specular anodized, of low iridescent and constructed of sheet aluminum. Baffle shall be constructed to ensure rigidity and parabolic contours through interlocking cell assembly.
9. Prismatic lenses shall be of virgin acrylic plastic pattern 12 (0.125 inches thick prestressed to span 48-inches) unless specified otherwise on plans.
10. Fluorescent luminaires mounted in accessible ceiling areas shall utilize a plug together modular wiring system. The system shall be installed with all required fittings, plugs, and cord drops for a complete and operating system.
11. Compact fluorescent luminaire shall incorporate an End of Life (EOL) protection device.

E. Low Pressure Sodium Luminaires

1. Low pressure sodium luminaires shall comply with HID luminaire requirements where applicable.

F. HID Luminaires

1. HID luminaires shall be provided with porcelain, screw type mogul sockets UL listed for 1500W or higher at 600 volts where applicable.
2. High-pressure sodium luminaires shall operate ballasts and lamps with lamp in open and short circuit conditions for 6 months without significant ballast life loss.
3. High-pressure sodium luminaires shall operate within 2% of their labeled wattage with a +/-10% variance of input rated voltage. Power factor shall maintain minimum of 85% through life.

2.5 LUMINAIRE SUPPORT COMPONENTS

A. Description: Comply with AASHTO LTS-3 for pole or other support structures, brackets, arms, accessories, base, and anchorage and foundation.

B. Wind-Load Strength of Total Support Assembly: Adequate to carry support assembly plus luminaires at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of 110 mph with a gust factor of 1.3. Support assembly includes pole or other support structures, brackets, arms, appurtenances, base, and anchorage and foundation.

C. Finish: Match finish of pole/support structure for arm, bracket, and tenon mount materials.

D. Mountings, Fasteners, and Accessories: Corrosion-resistant items compatible with support components.

1. Materials: Will not cause galvanic action at contract points.
2. Mountings: Correctly position luminaire to provide indicated light distribution.
3. Anchor Bolts, Nuts, and Washers: Hot-dip galvanized after fabrication unless stainless-steel items are indicated.

4. Anchor-Bolt Template: Plywood or steel.

2.6 LUMINAIRE TYPES

A. See Fixture Schedule on electrical drawing.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Any discrepancies with specified luminaire and its proposed use or environment shall be brought to the Engineer's attention as soon as possible.

1. At project close-out, a list of damaged fixtures received by the contractor shall be provided to the Electrical Engineer for evaluation of fixture manufacturers shipping and packaging methods.

3.2 INSTALLATION

A. Luminaires shall be installed complete with all accessories, glassware, canopies, sockets, reflectors, optics, wiring devices and supplied with new lamps of the type and wattage indicated on plans or in this specification unless specifically noted otherwise.

B. Concrete Foundations: Construct according to details and drawings.

1. Comply with details for reinforcement and for anchor bolts, nuts, and washers. Verify anchor-bolt templates by comparing with actual pole bases furnished.

C. Install poles as follows:

1. Use web fabric slings (not chain or cable) to raise and set poles.
2. Mount pole to foundation with leveling nuts, and tighten top nuts to torque level recommended by pole manufacturer.
3. Secure poles level, plum, and square.
4. Grout void between pole base and foundation. Use nonshrinking or expanding concrete grout firmly packed in entire void space.

D. All luminaires (where applicable) shall be supported in accordance with ASTM E-580 recommended guidelines for seismic restraint, as well as the latest version of the Uniform Building Code related to lateral and vertical bracing, including but not limited to:

1. Recessed luminaires shall have a minimum of two (2) #12 gauge wires attached to structure above, independent of ceiling support system.
2. All lighting fixtures shall be positively attached to the suspended ceiling system. The attachment device shall have a capacity of 100 percent of the lighting fixture weight acting in any direction.
3. Pendant-hung lighting fixtures shall be supported directly from the structure above with #9 gauge wire or approved alternate support without using the ceiling suspension system for direct support.

E. Mount luminaires in mechanical yards, areas and rooms to clear any mechanical equipment, conduit and clearances. Coordinate mounting with mechanical plans.

F. Junction box and ballast compartment shall be accessible from below when housing is installed in final position. Wiring shall be secured from damage when accessed for relamping.

G. Fire rated gypsum board enclosures shall be constructed around all recessed luminaires that penetrate fire rated areas.

H. Actual locations of luminaires and dimensions shall be referenced to architectural drawings. Electrical plans shall not be used to scale for construction purposes. Any discrepancies shall be brought to the engineer's attention prior to installation.

I. Provide additional junction boxes as required where conductor exceeds factory provided junction box limitations.

J. Installation shall be appropriately coordinated with all disciplines to insure proper ventilation and heat dissipation as required per manufacturer.

K. Where luminaires are served from two sources, a barrier shall be provided to separate emergency source from normal source with notation indicating separate sources.

L. All wall mounted fixtures shall be mounted to a supporting wall bracing material in addition to the junction box. The bracing shall be installed behind the finished wall surface and be secured to structural elements in the wall. The bracing shall be capable of supporting the weight of the fixture and comply with manufacturer’s requirements and recommendations.

M. Pendant luminaires shall be mounted in a uniform mounting height and in straight continuous rows. Final coordination with mechanical equipment and plumbing fixtures shall be made in the field to ensure consistent spacing and locations.

N. Luminaire Attachment: Fasten to indicated structural supports.

O. Luminaire Attachment with Adjustable Features or Aiming: Attach luminaires and supports to allow aiming for indicated light distribution.

P. Lamp luminaires with indicated lamps according to manufacturer’s written instructions. Replace malfunctioning lamps.

Q. All exterior wall mounted fixtures shall be sealed watertight between the fixture housing or the canopy and the wall (or structure). Clear silicone caulking (or matching color), shall be used.

3.3 CONNECTIONS

A. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer’s published torque-tightening values.
2. Ground metal poles/support structures according to Division 26 Section “Grounding and Bonding.”

3.4 DELIVERY, STORAGE, AND HANDLING OF POLES

A. Package aluminum poles for shipping according to ASTM B 660.

B. Store poles on decay-resistant treated skids at least 12 inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.

C. Retain factory-applied pole wrappings on fiberglass poles until just before pole installation. Handle poles with web fabric straps.

D. Retain factory-applied pole wrappings on metal poles until just before pole installation. For poles with nonmetallic finishes, handle with web fabric straps.

3.5 FIELD TESTING

A. Upon completion of installation, an operation test shall be conducted to show that all equipment operates in accordance with the requirement of this specification.

B. All applicable tests shall be conducted in the presence of an Owner Representative and copies of any reports shall be provided.

C. Reports shall indicate when and where the test was conducted and who was present.

D. Upon completion of installations, luminaires requiring positioning shall be adjusted and aimed at final position.

3.6 CLEANING AND REPAIR

A. After complete lighting installation and before project completion, all damaged or faulty lenses or louvers in luminaires shall be replaced by the Electrical Contractor, at no additional cost to the Owner.

B. All anodized or highly visual or optically sensitive reflectors shall be cleaned of all fingerprints and smudges for a clean installation per manufacturers' recommendations.

C. All luminaires with paint scratches, dents or deformations due to installation or shipping shall be repaired, touched up or replaced as required or deemed necessary by the Electrical Engineer at no additional cost to the Owner.

D. Upon final installation of individual luminaires, dirt and debris shall be removed from luminaire enclosures.

END OF SECTION 265600

SECTION 28 31 11 - DESIGN/BUILD FIRE ALARM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general conditions, Division 1, and Basic Electrical Requirements (Section 26 05 00) are part of this section and the contract for this work and apply to this section as fully as if repeated herein.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 DESCRIPTION

A. The Contractor shall design, furnish and install a complete and operating life safety, design/build fire alarm system in compliance with all applicable state and local codes and ordinances. The Contractor shall review the construction documents including architectural, mechanical, plumbing, electrical, etc. as required to properly coordinate with all design disciplines and include all coordination work in the design and cost. The Contractor shall coordinate with other design/build disciplines, including fire sprinkler systems, elevator systems, and include all coordination items in the fire alarm system design and cost. The Contractor shall submit completed drawings to the governing fire code authority and obtain design approval and construction permits as required. All costs necessary for a code-compliant system shall be included in the fire alarm system design/build cost.

B. The design/build system shall include the design, furnishing, installation, connection and testing of an addressable microprocessor controlled fire alarm system. It shall include, but not be limited to, alarm initiating devices, trouble indicating devices, main fire alarm control panel, auxiliary control devices, annunciation devices, annunciator panels, transducer panels, and wiring.

C. The alarm system shall comply with requirements of the latest version of NFPA Standard 72 for protected Premises Signaling Systems except as modified and supplemented by this specification.

1.3 SCOPE

A. A new intelligent reporting, microprocessor-controlled automatic and manual fire detection and alarm system shall be installed in accordance with all state and local requirements. As a minimum, the system shall monitor the following: Manual alarm, waterflow alarm switches, valve supervisory tamper switches, post indicator valves, back-flow preventer supervisory switches, smoke/heat detectors for elevator re-call, and door release, duct smoke detectors and/or area smoke detectors for fan stop and control of fire/smoke dampers, and heat detectors for elevator shut-down. The system shall include dry relay contacts for connection to a digital alarm communicator transmitter for Central Station Monitoring.

B. Basic Performance

1. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be

encoded on NFPA Style 4 (Class B) Signaling Line Circuits (SLC).
2. Initiation Device Circuits (IDC) shall be wired Class B (NFPA Style B) as part of an addressable device connected by the SLC Circuit.

1.4 BASIC SYSTEM FUNCTIONAL OPERATION

A. When an alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:

1. The system alarm LED on the control panel shall flash.
2. A local piezo electric signal in the control panel shall sound.
3. A backlit 80 character LCD display on the control panel shall indicate all information associated with the alarm condition, including the type of alarm point and its location within the protected premises.
4. History storage equipment shall log the information associated each new alarm control panel condition, along with time and date of occurrence.
5. All system output programs assigned via control-by-event programming corresponding to the particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.

1.5 SUBMITTALS

A. General:

1. Six copies of all submittals shall be submitted to the Architect/Engineer for review.
2. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

B. Shop Drawings:

1. Scaled drawings (1/8” equals 1’ 0”) shall be provided.
2. Include manufacturer's name, model numbers, ratings, power requirements, voltage drop calculations, battery back-up calculations, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
3. Show annunciator layout, configurations, and termination on the architect’s floor plans.
4. Provide additional documents as may be required by the governing code authority.

C. Manuals:

1. Submit simultaneously with the shop drawings, complete operating manuals listing the manufacturer's name(s), including technical data sheets.
2. Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.
3. Provide a clear and concise description of operation that gives, in detail, the alarm, supervisory, and trouble conditions.

D. Software Modifications

1. Provide the services of a factory trained and authorized technician to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 24 hours.
2. Provide all hardware, software, programming tools and documentation necessary to modify the alarm system on site

E. Certifications:

1. Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the installing contractor is an authorized representative of the major equipment manufacturer. Include names and addresses in the certification.

1.6 GUARANTEE

A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included.

1.7 QUALITY ASSURANCE AND STANDARDS

A. The specifications and standards listed below form a part of this specification. The system shall fully comply with the latest issue of these standards, if applicable.

B. National Fire Protection Association (NFPA) - USA:

C. Underwriters Laboratories Inc. (UL) - USA:

D. California State Building Codes.

E. All requirements of the Local fire authority.

1.8 APPROVALS:

A. The system shall have proper listing and/or approval from the following recognized agencies:

1. UL - Underwriters Laboratories Inc.
2. FM - Factory Mutual
3. CSFM - California State Fire Marshal
4. Local fire authority

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIAL, GENERAL

A. All equipment and components shall be new, and the manufacturer's current model.

B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations.

2.2 CONDUIT AND WIRE

A. Conduit:

1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.

2. Conduit shall not enter the alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the fire alarm system manufacturer.
3. Conduit shall be 3/4 inch minimum.

B. Wire:

1. All alarm system wiring shall be new.
2. Wiring shall be in accordance with local, state and national codes and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG.
3. All wire and cable shall be listed and/or approved by a recognized testing agency.
4. All field wiring shall be electrically supervised for open circuit and ground fault.

C. Terminal Boxes, Junction Boxes and Cabinets:

1. All boxes and cabinets shall be UL listed for their use and purpose.

2.3 MAIN ALARM CONTROL PANEL

A. The main control panel shall be equal to a NOTIFIER Model AFP-200 and shall contain a microprocessor based Central Processing Unit (CPU). The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent addressable smoke and thermal (heat) detectors, addressable modules, printer, annunciators, and other system controlled devices.

B. System Capacity and General Operation:

1. The control panel shall provide, or be capable of expansion to 198 intelligent/addressable devices.
2. The control panel shall include Form-C alarm, trouble, supervisory, and security relays rated at a minimum of 3.0 amps at 30 VDC. It shall also include four Class B (NFPA Style Y) or Class A (NFPA Style Z) programmable Notification Appliance Circuits.
3. The alarm control panel shall include a full featured operator interface control and annunciation panel that shall include a backlit Liquid Crystal Display (LCD), individual color coded system status LEDs, and an alphanumeric keypad for the field programming and control of the alarm system.
4. All programming or editing of the existing program in the system shall be achieved without special equipment and without interrupting the alarm monitoring functions of the alarm control panel. The system shall be fully programmable, configurable, and expandable in the field without the need for special tools, PROM programmers or PC based programmers. It shall not require replacement of memory ICs to facilitate programming changes.
5. The system shall allow the programming of any input to activate any output or group of outputs.

C. The main control panel shall provide the following features:

1. Drift compensation to extend detector accuracy over life. Drift compensation shall also include a smoothing feature, allowing transient noise signals to be filtered out.
2. Detector sensitivity test, meeting requirements of NFPA 72, Chapter 7.
3. Maintenance alert, with two levels (maintenance alert/maintenance urgent), to warn of excessive smoke detector dirt or dust accumulation.
4. The ability to display or print system reports.
5. Periodic detector test, conducted automatically by the software.

D. Signaling Line Circuits (SLC)

1. The system shall include one SLC. The SLC interface shall provide power to and communicate with up to 99 intelligent detectors (ionization, photoelectric or thermal) and 99 intelligent modules (monitor or control) for a system capacity of 198 devices. The SLC shall be capable of NFPA 72 Style 4, Style 6, or Style 7 (Class A or B) wiring.
2. The Loop Interface Board (LIB) shall receive analog information from all intelligent detectors to be processed to determine whether normal, alarm, pre-alarm, or trouble conditions exist for each detector. The software shall automatically maintain the detector's desired sensitivity level by adjusting for the effects of environmental factors, including the accumulation of dust in each detector. The analog information shall also be used for automatic detector testing and for the automatic determination of detector maintenance requirements.
3. The detector software shall meet NFPA 72, Chapter 7 requirements and be certified by UL as a calibrated sensitivity test instrument.
4. The detector software shall allow manual or automatic sensitivity adjustment.

E. Serial Interfaces

1. The system shall include two serial RS - 232 interfaces. Each interface shall be a means of connecting UL Listed Electronic Data Processing (EDP) peripherals.
2. The system shall include an RS – 485S port for the serial connection of optional annunciators and remote LCD displays.
3. The RS - 485 interface may be used for network connection to a proprietary receiving unit.

F. Notification Appliance Circuit (NAC) Module

1. The Notification Appliance Circuit module shall provide four fully supervised Class A or B (NFPA Style Z or Y) notification circuits.
2. The notification circuit capacity shall be 3.0 amperes maximum.

G. Control Relay Module

1. The control relay module shall provide eight Form-C auxiliary relay circuits rated at 5 amperes, 28 VDC.
2. Each relay circuit shall be capable of being activated (change in state) by any initiating device or from any combination of initiating devices.

H. Enclosures:

1. The control panel shall be housed in a UL-listed cabinet suitable for surface or semi-flush mounting. The cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish.
2. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators. For convenience, the door may be selected for either right or left hand hinging.

I. Power Supplies:

1. The main power supply for the alarm control panel shall provide 3.0 amps of available power for the control panel and peripheral devices.
2. The main power supply shall continuously monitor all field wires for earth ground conditions.
3. The main power supply shall provide a battery charger for 24 hours of standby using dual-rate charging techniques for fast battery recharge.
4. A separate auxiliary power supply for door holders shall be provided. Loss of 120 VAC

power to the auxiliary power supply shall release the door holders.
5. All circuits shall be power-limited, per UL864 requirements.

2.4 SYSTEM COMPONENTS

A. Waterflow Indicator:

1. Waterflow Switches shall be furnished by the Sprinkler Contractor.
2. Waterflow Switches shall be connected under this section but installed and adjusted by the sprinkler contractor.

B. Sprinkler and Valve Supervisory Switches

1. Each sprinkler system water supply control valve riser, zone control valve, and standpipe system riser control valve shall be equipped with a supervisory switch.
2. PIV (post indicator valve) or main gate valves shall be equipped with a supervisory switch.
3. Valve supervisory switches shall be connected under this section and furnished, installed, and adjusted for proper operation by the sprinkler contractor.

C. Serially Connected Annunciator, equal to NOTIFIER LCD-80

1. The annunciator shall communicate with the alarm control panel via a two wire RS – 485S (multi-drop) communications circuit.
2. The annunciator shall require no more than four wires for operation. Annunciation shall include: intelligent addressable points, system software zones, control relays, and notification appliance circuits. The following operations shall also be provided:

D. Door Holders

1. Door holders shall be furnished by the Hardware Contractor.
2. Door holders shall be connected and powered under this section but installed and adjusted by the hardware contractor.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

C. All detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas. Final device coordination shall be coordinated with the project architect.

D. Manual pull station shall be suitable for surface mounting or semiflush mounting as shown on the plans, and shall be installed 48 inches above the finished floor.

E. Smoke detector(s) at the top of the elevator hoistway(s) shall be mounted on a U.L. 10-B self closing and self locking access door(s). Access door(s) shall be provided and installed by other divisions of the specifications.

3.2 TEST

A. The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72, Chapter 7.

B. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

C. Close each sprinkler system flow valve and verify proper supervisory alarm at the main control panel.

D. Verify activation of all waterflow switches.

E. Open initiating device circuits and verify that the trouble signal actuates.

F. Open and short signaling line circuits and verify that the trouble signal actuates.

G. Ground all circuits and verify response of trouble signals.

H. Check installation, supervision, and operation of all intelligent smoke and heat detectors.

I. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the main control panel and the correct activation of the control points.

3.3 FINAL INSPECTION

A. At the final inspection, a factory trained representative of the manufacturer of the major equipment shall demonstrate that the system functions properly in every respect.

3.4 INSTRUCTION

A. Instruction shall be provided to the building operator as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

B. The Contractor shall provide a written "Sequence of Operation" which shall be included in the Operations Manual and reviewed during the training period.

END OF SECTION 28 31 11

SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Removing existing groundcovers.
   2. Clearing and grubbing.
   3. Stripping and stockpiling topsoil.
   4. Removing above- and below-grade site improvements.
   5. Disconnecting and capping or sealing site utilities.
   6. Temporary erosion and sedimentation control measures.

1.2 MATERIAL OWNERSHIP

A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.3 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

D. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 31 Section "Earth Moving."

1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly flag trees and vegetation to remain or to be relocated.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to Water Pollution Control Plan.

B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 UTILITIES

A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.

1. Arrange with utility companies to shut off indicated utilities.

B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.

3.4 CLEARING AND GRUBBING

A. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

3.5 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

3.6 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

3.7 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

1. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Preparing subgrades for slabs-on-grade, walks, pavements, and exterior plants.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for slabs-on-grade.
4. Subbase course for concrete walks and pavements.
5. Subbase and base course for asphalt paving.
6. Excavating and backfilling for utility trenches.

1.2 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Course placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.3 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM AASHTO M 145 Soil Classification Groups A-1, A-2-4, A-2-5, and A-3, or a combination of these groups; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487 or A-2-6, A-2-7, A-4, A-5, A-6, and A-7 according to AASHTO M 145, or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 31 Section "Site Clearing."

C. Protect and maintain erosion and sedimentation controls, which are specified in Division 31 Section "Site Clearing." during earthwork operations.

3.2 EXCAVATION

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.3 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.4 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.5 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit, unless otherwise indicated.

1. Clearance: 12 inches (300 mm) each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material, 4 inches (100 mm) deeper elsewhere, to allow for bedding course.

3.6 SUBGRADE INSPECTION

A. Proof-roll subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.7 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when approved by Architect.

1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

3.8 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.9 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Backfill trenches excavated under footings and within 18 inches (450 mm) of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 03.

D. Provide 4-inch- (100-mm-) thick, concrete-base slab support for piping or conduit less than 30 inches (750 mm) below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches (100 mm) of concrete before backfilling or placing roadway subbase.

E. Place and compact initial backfill of subbase material or satisfactory soil, free of particles larger than 1 inch (25 mm) in any dimension, to a height of 12 inches (300 mm) over the utility pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

F. Place and compact final backfill of satisfactory soil to final subgrade elevation.

G. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.10 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under building slabs, use engineered fill.

5. Under footings and foundations, use engineered fill.

3.11 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 90 percent.
3. Under lawn or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 85 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.13 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus or minus 1 inch (25 mm)
2. Walks: Plus or minus 1 inch (25 mm)
3. Pavements: Plus or minus 1/2 inch (13 mm)

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.

3.14 SUBBASE AND BASE COURSES

A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase and base course under pavements and walks as follows:

1. Shape subbase and base course to required crown elevations and cross-slope grades.
2. Compact subbase and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698

3.15 DRAINAGE COURSE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Place drainage course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.16 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.17 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 312000

SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cold milling of existing hot-mix asphalt pavement.
2. Hot-mix asphalt patching.
3. Hot-mix asphalt paving.
4. Hot-mix asphalt paving overlay.
5. Pavement-marking paint.

B. Related Sections:

1. Division 31 Section "Earth Moving" for aggregate subbase and base courses and for aggregate pavement shoulders.
2. Division 32 Section "Concrete Paving Joint Sealants" for joint sealants and fillers at paving terminations.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

1. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
2. Job-Mix Designs: For each job mix proposed for the Work.

B. Material Certificates: For each paving material, from manufacturer.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction in which Project is located

B. Retain first paragraph below if asphalt paving work is located on public property and must comply with requirements of state or local DOT. Also retain if referencing these requirements regardless of property ownership.

C. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the City of San Diego for asphalt paving work.

1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

D. Preinstallation Conference: Conduct conference at Project site.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:

1. Tack Coat: Minimum surface temperature of 60 deg F (15.6 deg C).
2. Asphalt Base Course: Minimum surface temperature of 40 deg F (4.4 deg C) and rising at time of placement.
3. Asphalt Surface Course: Minimum surface temperature of 60 deg F (15.6 deg C) at time of placement.

B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F (4.4 deg C) for oil-based materials, 55 deg F (12.8 deg C) for water-based materials, and not exceeding 95 deg F (35 deg C).

PART 2 - PRODUCTS

2.1 AGGREGATES

A. Coarse Aggregate: ASTM D 692, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.

B. Fine Aggregate: ASTM D 1073 sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.

C. Mineral Filler: ASTM D 242 rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

A. Asphalt Binder: AASHTO M 320

B. Tack Coat: ASTM D 977 emulsified asphalt, or ASTM D 2397 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

2.3 AUXILIARY MATERIALS

A. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wettable powder form.

B. Pavement-Marking Paint: MPI #32 Alkyd Traffic Marking Paint.

1. Color: Per Plan.

C. Glass Beads: AASHTO M 247, Type 1.

D. Wheel Stops: Precast, air-entrained concrete, 2500-psi (17.2-MPa) minimum compressive strength, 4-1/2 inches (115 mm) high by 9 inches (225 mm) wide by 72 inches (1800 mm) long. Provide chamfered corners, drainage slots on underside, and holes for anchoring to substrate.

1. Dowels: Galvanized steel, 3/4-inch (19-mm) diameter, 10-inch (254-mm) minimum length.

E. Wheel Stops: Solid, integrally colored, 96 percent recycled HDPE or commingled postconsumer and postindustrial recycled plastic; UV stabilized; 4 inches (100 mm) high by 6 inches (150 mm) wide by 72 inches (1800 mm) long. Provide chamfered corners, drainage slots on underside, and holes for anchoring to substrate.

1. Dowels: Galvanized steel, 3/4-inch (19-mm) diameter, 10-inch (254-mm) minimum length.
2. Adhesive: As recommended by wheel-stop manufacturer for application to asphalt pavement.

2.4 MIXES

A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction; designed according to procedures in AI MS-2, "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types"; and complying with the following requirements:

1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
2. Base Course: Per Plan
3. Surface Course: Per Plan

PART 3 - EXECUTION

3.1 EXAMINATION

A. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

B. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

C. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.3 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Spread mix at minimum temperature of 250 deg F (121 deg C).
2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet (3 m) wide unless infill edge strips of a lesser width are required.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.4 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches (150 mm).
3. Offset transverse joints, in successive courses, a minimum of 24 inches (600 mm).
4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

3.5 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F (85 deg C).

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

G. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.6 ASPHALT CURBS

A. Construct hot-mix asphalt curbs over compacted pavement surfaces. Apply a light tack coat unless pavement surface is still tacky and free from dust. Spread mix at minimum temperature of 250 deg F (121 deg C).

1. Asphalt Mix: Same as pavement surface-course mix.

B. Place hot-mix asphalt to curb cross section indicated or, if not indicated, to local standard shapes, by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish. Remove forms after hot-mix asphalt has cooled.

3.7 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch (13 mm).
2. Surface Course: Plus 1/4 inch (6 mm), no minus.

B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch (6 mm)
2. Surface Course: 1/8 inch (3 mm)

3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch (6 mm).

3.8 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow paving to age for 30days before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils (0.4 mm).

1. Broadcast glass beads uniformly into wet pavement markings at a rate of 6 lb/gal. (0.72 kg/L).

3.9 WHEEL STOPS

A. Install wheel stops in bed of adhesive as recommended by manufacturer.

B. Securely attach wheel stops to pavement with not less than two galvanized-steel dowels embedded at one-quarter to one-third points. Securely install dowels into pavement and bond to wheel stop. Recess head of dowel beneath top of wheel stop.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Replace and compact hot-mix asphalt where core tests were taken.

C. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.11 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

END OF SECTION 321216

SECTION 32 12 18

DECOMPOSED GRANITE PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: All services, labor, materials, transportation, tools and equipment necessary to perform the work indicated on the Drawings including the installation of base material and header edging.

B. Related Documents: The Conditions of the Contract and Division 1 are a part of this Section as fully as if repeated herein.

C. Related work specified elsewhere:

1. Section 01 10 10 - Sustainable Design Requirements.

2. Section 32 93 00 – Plants **(Recycled Plastic lumber Edger, Metal Edger and Cor-ten steel edger)**

1.2 REFERENCES

A. The edition of the specifications and standards referenced herein, published by the following organization, apply to the granular paving work only to the extent specified by the reference. Refer to Section 01420 for information concerning availability and use of references.

B. Standard Specifications for Public Works Construction

1.3 SUBMITTALS

A. Products and Data:

1. Conform to procedures and quantities as specified under Section 01330.

2. For base course, submit material Certification and Analysis Report.

3. Decomposed Granite: Provide (2) two packaged samples equal to one half (1/2) pound, include source of material with telephone number and address.

4. Aggregate Binder: Provide (2) two packaged samples equal to one half (1/2) pound, including manufacturer's instructions for mixing and application.

5. Decomposed Granite and Binder Compound: Provide a packaged sample, pre-blended in proportions recommended by the manufacturer, and equal to one (1) pound.

1.4 FIELD MOCK-UP

A. Before installing D.G. paving, construct a field mockups at earliest possible time and at approved location before proceeding with the work.

1. Prepare three (3) 8 feet by width of path, paving mock-ups, complete with base coarse, three (3) different edging conditions in each mock-up, and compacted as specified. Include adjustments, approved by the Owner's Representative from reviews of the mock-up process. Coordinate work with conditions and material placement of other work and adjacent conditions.

2. Notify Landscape Architect seven days in advance of dates and times when mockups will be constructed.

3. Demonstrate the proposed range of aesthetic effects and workmanship.

4. Obtain Landscape Architect's approval of mockups prior to proceeding with the work. When necessary, remove and reconstruct the field sample until approved. Approved mock-up shall serve as the standard of acceptance for the work.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

6. Demolish and remove mockups when directed.

7. When the Landscape Architect determines that a Field-Constructed Mock-up does not meet the requirements, retain it for reference and construct another Field-Constructed Mock-up until it is accepted.

8. Approval mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 QUALITY ASSURANCE

A. Use skilled workmen trained and experienced in the necessary crafts, and who are completely familiar with the requirements and the methods needed for proper performance of the work of this Section.

1.6 DELIVERY, STORAGE AND HANDLING

A. Pre-blended Material: Deliver material in sealed containers that are clearly labeled with the name, weight, batch number, and supplier.

B. Bulk Material: Comply with Section 01600 for delivery and storage requirements.

C. Do not expose materials to moisture or other conditions that would adversely affect their serviceability.

D. Store materials out of the weather and off the ground.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Decomposed Granite (DG): Paving material shall be crushed stone, maximum 3/8" minus with fines from granite source rock. Type and source per the Drawings.

B. Binder Component: Shall be Stabilizer™ available from KRC Rock, San Marcos, CA. (760) 744-1036, no know equal. Leave as shown here or add to (and refer to) the schedule if DG is specified on the Drawings.

C. Water, clean potable.

D. Base Material: Crushed aggregate base consisting entirely of crushed rock and rock dust, uniformly graded and conforming to the requirements of Standard Specifications Section.

2.2 HEADER AND EDGING MATERIALS

A. Refer to Section 32 93 00 – Plants for edging.

B. Refer to Section 03 33 01 – Landscape Architectural Concrete for concrete curb and headers.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Areas receiving paving materials shall be examined for correct and complete base preparation, compaction, grade, pitch, and drainage installation.

B. Prepared subgrade shall be proof rolled to check for unstable conditions and areas requiring additional compaction. The subgrade shall be compacted to a minimum 95% dry density. A compaction test shall be taken at questionable areas identified by the Owner's Representative.

C. Report unsatisfactory conditions to the Owner's Representative. Do not begin paving work until unsatisfactory conditions have been corrected and is ready to receive paving. Proceeding with the installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

D. Herbicide Treatment: Pre-emergence herbicide shall be recommended and applied by a licensed pest control service. Apply herbicide in strict compliance with manufacturer's recommended instructions, and local and state regulations. Apply to compacted, dry, subgrade prior to application of aggregate base course. Do not use weed control chemicals that may stain decomposed granite or surrounding surfaces.

3.2 PREPARATION

A. The base for the paving shall be a layer of crushed aggregate base material, with a 1" layer of sifted stone dust fines. The fines shall be thoroughly watered into the base rock and roll to compaction. The finished depth of the base course shall be as indicated on the Drawings.

B. The binding agent shall be mixed at the rate of 13 pounds per ton (2000 pounds) of decomposed granite.

C. Whether pre-mixed or mixed on site, the decomposed granite and binding agent shall be thoroughly blended and tumbled in a cement mixer or pug mill at the rate specified.

3.3 INSTALLATION

A. Apply quantity to achieve depth indicated on the Drawings. Areas shall be raked and graded to achieve a smooth finished surface after rolling.

B. Areas shall be thoroughly watered to the full depth of the paving material.

C. Rolling of the mixture shall commence once thorough moisture penetration is completed. The paving areas shall be compacted with a small riding roller or power walk-behind roller. Pneumatic compactors are not permitted. Corners and areas not accessible to the roller shall be hand tamped to match the compaction of the adjacent area. The finished surface shall be smooth and consistent across the entire area, free of ruts, dips, humps, and roller marks.

D. At the end of the day, the installation shall terminate at a paving edge or other transition. No material shall be deposited on paving which has hardened sufficiently to cause the formation of seams, planes, weakness within the section, or visible lines in the finished surface.

E. Protect the entire area from foot or vehicular traffic until fully dried. Protect the area from contamination or damage by other work in progress.

3.4 MAINTENANCE

A. Patch and or replace areas damaged during the construction period. Remove weeds by hand, rake smooth, moisten and re-compact to a smooth finished surface. Do not use weed control chemicals that may stain the decomposed granite or other surface materials.

END OF SECTION

SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:

1. Driveways and roadways.
2. Parking lots.
3. Curbs and gutters.
4. Walkways.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete pavement mixture.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.

B. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

B. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

C. Reinforcing Bars: ASTM A 615/A 615M

D. Plain Steel Wire: ASTM A 82, as drawn.

E. Deformed-Steel Wire: ASTM A 496.

F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice."

2.2 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:

1. Portland Cement: ASTM C 150

a. Fly Ash: ASTM C 618
b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate, uniformly graded. Provide aggregates from a single source.

C. Water: ASTM C 94/C 94M.

D. Air-Entraining Admixture: ASTM C 260.

E. Chemical Admixtures: ASTM C 494/C 494M, of type suitable for application, certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

2.3 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

E. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

F. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.

2.4 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber

B. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, nonfading, and resistant to lime and other alkalis.

C. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery with emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.

2.5 WHEEL STOPS

A. Wheel Stops: Precast, air-entrained concrete

1. Dowels: Galvanized steel, 3/4-inch (19-mm) diameter, 10-inch (254-mm) minimum length.

2.6 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, with the following properties:

1. Compressive Strength (28 Days): 2500 PSI (minimum).

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

3.4 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, or to match jointing of existing adjacent concrete pavement, where applicable.

E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/2 INCH. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.5 CONCRETE PLACEMENT

A. Moisten subbase to provide a uniform dampened condition at time concrete is placed.

B. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

C. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

D. Screed pavement surfaces with a straightedge and strike off.

E. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.6 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
2. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch (1.6 to 3 mm) deep with a stiff-bristled broom, perpendicular to line of traffic.

C. Slip-Resistive Aggregate Finish: Before final floating, spread slip-resistive aggregate finish on pavement surface according to manufacturer's written instructions.

1. Cure concrete with curing compound recommended by slip-resistive aggregate manufacturer. Apply curing compound immediately after final finishing.
2. After curing, lightly work surface with a steel wire brush or abrasive stone and water to expose nonslip aggregate.

3.7 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

3.8 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch (6 mm).
2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
3. Surface: Gap below 10-foot- (3-m-) long, unleveled straightedge not to exceed 1/4 inch (6 mm).
4. Joint Spacing: 3 inches (75 mm).
5. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
6. Joint Width: Plus 1/8 inch (3 mm), no minus.

3.9 PAVEMENT MARKING

A. Allow concrete pavement to cure for 28 days and be dry before starting pavement marking.

B. Sweep and clean surface to eliminate loose material and dust.

C. Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils (0.4 mm).

3.10 WHEEL STOPS

A. Securely attach wheel stops into pavement with not less than two galvanized steel dowels embedded in holes drilled or cast into wheel stops at one-quarter to one-third points. Firmly bond each dowel to wheel stop and to pavement. Securely install dowels into pavement and bond to wheel stop. Recess head of dowel beneath top of wheel stop.

3.11 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.

B. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement.

C. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

SECTION 321723 - PAVEMENT MARKINGS

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 painted markings applied to asphalt and concrete pavement.

B. Related Requirements:

1. Section 099113 "Exterior Painting" for painting exterior concrete surfaces other than pavement.
2. Section 099123 "Interior Painting" for painting interior concrete surfaces other than pavement.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include technical data and tested physical and performance properties.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of State and local jurisdictions for pavement-marking work.

1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces free of debris and fine particles, and at a minimum ambient or surface temperature of 40 deg F for alkyd materials, 55 deg F for water-based materials, and not exceeding 95 deg F with a Relative humidity of less than 80%.

B. All existing conflicting pavement markings shall be removed by sandblasting procedures. Black or grey out of existing or proposed pavement markings shall not be allowed.

1.6 2013 CBC CODE REQUIREMENTS

A. Pavement markings: Accessible parking spaces shall be located as near as practical to a primary entrance and shall be marked according to CBC Sections 1129B.3 and 1129B.4.

B. Surface slopes of accessible parking spaces and access aisles shall be the minimum possible and shall not exceed 2% slope in any direction. CBC Section 1129B.3, Item 4.

C. Loading and unloading access aisles shall be marked by a border painted blue. Within the blue border, hatched lines a maximum of 36" on center shall be painted a color contrasting with the parking surface, preferably blue or white. CBC Figures 11B-18A through 11B-18C.

D. When blue color is used, it shall conform to Color No. 15090 per Federal Standard 595B.

E. Painted lines and markings on pavement are recommended to be 3" wide minimum.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Dunn-Edwards Corporation.
   2. Ennis Traffic Safety Solutions, Inc.
   3. Frazee Paint.
   4. PPG Industries.
   5. Sherwin-Williams Company (The).

2.2 PAVEMENT-MARKING PAINT

A. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with AASHTO M 248, Type N, F, S; colors complying with FS TT-P-1952.

   1. Color: White.

B. Pavement-Marking Paint: MPI #32, alkyd traffic-marking paint.

   1. Color: White.

C. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than 45 minutes.

   1. Color: White.

D. Pavement-Marking Paint: MPI #97, latex traffic-marking paint.

   1. Color: White.

E. Glass Beads: AASHTO M 247, Type 1 made of 100 percent recycled glass.

1. Roundness: Minimum 80 percent true spheres by weight.

F. VOC Content: Pavement markings used on building interior shall have a VOC content of 150 g/L or less.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.

B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.2 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow paving to age for a minimum of 30 days before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil to prevent paint application beyond the stencil. Apply paint so that it cannot run beneath the stencil.
2. Broadcast glass beads uniformly into wet markings at a rate of 6 lb/gal. .

3.3 PROTECTING AND CLEANING

E. Protect pavement markings from damage and wear during remainder of construction period.

F. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 321723

SECTION 32 84 00 - PLANTING IRRIGATION

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. Piping.
2. Encasement for piping.
3. Pressure-reducing valves.
4. Automatic control valves.
5. Automatic drain valves.
6. Transition fittings.
7. Dielectric fittings.
8. Miscellaneous piping specialties.
9. Sprinklers.
10. Quick couplers.
11. Drip irrigation specialties.
12. Controllers.
13. Boxes for automatic control valves.

1.3 DEFINITIONS

A. Circuit Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.

B. Drain Piping: Downstream from circuit-piping drain valves. Piping is not under pressure.

C. Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.

D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.4 PERFORMANCE REQUIREMENTS

A. Irrigation zone control shall be automatic operation with controller and automatic control valves.

B. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards. Maintain 100 percent irrigation coverage of areas indicated.

C. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties unless otherwise indicated:
   1. Circuit Piping PVC: 150 psi (1035 kPa)

1.5 SUBMITTALS

A. Water Pressure Test
   1. After award of contract and before any irrigation system materials are ordered from suppliers or delivered to the job site, submit to the City a written verification of the existing water pressure on the project at each of the points of connection shown.
   2. The water pressure test shall be performed to measure the dynamic water pressure at the point of connection at the maximum flow rate of the proposed irrigation system as shown on the point of connection note. Dynamic water pressure is when water is flowing through the point of connection. Static water pressure readings, water is not flowing, are not acceptable.
   3. Written dynamic water pressure test confirmation shall be made on the contractor's letterhead and include the flow rate during the test, the recorded water pressure, the date of the test and the time of the test.

B. Material List:

   1. After award of contract and before any irrigation system materials are ordered from suppliers or delivered to the job site, submit to the City a complete list of all irrigation system materials, or processes proposed to be furnished and installed as part of this contract.

   2. The submittals materials list shall include the following information:

      a. A title sheet with the job name, the contractor's name, contractor's address and telephone number, submittal date and submittal number.
      b. An index sheet showing the item number (i.e. 1,2,3, etc.); an item description (i.e. sprinkler head); the manufacturer's name (i.e. Hunter Industries); the item model number (i.e. I-40-ADV/36V); and the page(s) in the submittal set that contain the catalog cuts.
      c. The catalog cuts shall be one or two pages copied from the most recent manufacturer's catalog that indicate the product submitted. Do not submit parts lists, exploded diagrams, price lists or other extra information.

d. The catalog cuts shall clearly indicate the manufacturer's name and the item model number. The item model number, all specified options and specified sizes shall be circled on the catalog cuts.
e. Submittals for equipment indicated on the legend without manufacturer names, or "as approved", shall contain the manufacturer, Class or Schedule, ASTM numbers and/or other certifications as indicated in these specifications.

3. Submittal materials list format requirements:

a. Submittals shall be provided as one complete package for the project. Multiple partial submittals will not be reviewed.
b. Submittal package shall be stapled or bound in such a way as to allow for disassembly for review processing. Submittals shall not have tabs, tab sheets, spiral binding, or any other type of binding that will interfere with automated copying of submittals.
c. Submittal package shall have all pages numbered in the lower right hand corner. Page numbers shall correspond with submittal index.
d. Re-submitted packages must be revised to include only the equipment being re-submitted. Equipment previously reviewed and accepted shall not be re-submitted in the materials list/index sheet or in the catalog cut sheet package.

C. Substitutions: If the Irrigation Contractor wishes to substitute any equipment or materials for those equipment or materials listed on the irrigation drawings and specifications, he may do so by providing the following information to the Landscape Architect or City's authorized representative for approval.

1. Provide a written statement indicating the reason for making the substitution.
2. Provide catalog cut sheets, technical data, and performance information for each substitute item.
3. Provide in writing the difference in installed price if the item is accepted.
4. The Landscape Architect or City's authorized representative will allow no substitutions without prior written acceptance
5. No substitutions of pump manufacturers, distributors or assemblies will be accepted.
6. Manufacturer's warranties shall not relieve the Contractor of his liability under the guarantee. Such warranties shall only supplement the guarantee.

D. The Landscape Architect or City's authorized representative will not review the submittal package unless provided in the format described above.

E. Manufacturer's warranties shall not relieve the Contractor of his liability under the guarantee. Such warranties shall only supplement the guarantee.

F. The Landscape Architect or City's authorized representative will not review the submittal package unless provided in the format described above.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Provide at least one English speaking person who shall be present at all times during execution of this portion of the Work and who shall be thoroughly familiar with the type of materials being installed and the manufacturer's recommended methods of installation and who shall direct all Work performed under this section.

B. 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.

1.7 EXISTING CONDITIONS

A. The Contractor shall verify and be familiar with the locations, size and detail of points of connection provided as the source of water, and electrical supply connection to the irrigation system.

B. Irrigation design is based on the available static water pressure shown on the drawings. Contractor shall verify static water on the project prior to the start of construction. Should a discrepancy exist, notify the Landscape Architect and City's authorized representative prior to beginning construction.

C. Prior to cutting into the soil, the Contractor shall locate all cables, conduits, sewer septic tanks, and other utilities as are commonly encountered underground and he shall take proper precautions not to damage or disturb such improvements. If a conflict exists between such obstacles and the proposed work, the Contractor shall promptly notify the Landscape Architect and City who will arrange for relocations. The Contractor will proceed in the same manner if a rock layer or any other such conditions are encountered.

D. The Contractor shall protect all existing utilities and features to remain on and adjacent to the project site during construction. Contractor shall repair, at his own cost; all damage resulting from his operations or negligence.

E. The Irrigation Contractor shall coordinate with the General Contractor for installation of required sleeving as shown on the plans prior to paving operations.

F. The Contractor shall verify and be familiar with the existing irrigation systems in areas adjacent to and within the Project area of work.

G. The Contractor shall protect all existing irrigation systems, in areas adjacent to and within the project area of work, from damage due to his operations.

H. Contractor shall notify City’s Representative if any existing system is temporarily shut off, capped or modified. Provide 48-hour notice, prior to turning off or modifying any existing irrigation system.

I. The Contractor shall repair or replace all existing irrigation systems, in areas adjacent to and within the project area of work, damaged by the construction of this project.

Adjacent irrigation systems shall be made completely operational and provide complete coverage of the existing landscaped areas. All repairs shall be complete to the satisfaction of the City's Representative.

J. The contractor shall provide bore holes under any existing pavement or paving encountered for the required lateral, mainline and low voltage control wire sleeving. Bore holes under 2 inches in diameter and smaller shall be made with a BulletMole® underground boring tool as manufactured by Dimension Tools, LLC (Contact telephone number (888)-650-5554 or at www.bulletmole.com). Bore holes larger than 2 inches in diameter shall be made with an approved mechanical boring tool. No air jacking or hydraulic boring of any kind shall be allowed.

1.8 INSPECTIONS

A. The Contractor shall permit the Landscape Architect and City's authorized representative to visit and inspect at all times any part of the work and shall provide safe access for such visits.

B. Where the specifications require work to be tested by the Contractor, it shall not be covered over until accepted by the Landscape Architect, City's authorized representative, and/or governing agencies. The Contractor shall be solely responsible for notifying the Landscape Architect, City, and governing agencies, a minimum of 48 hours in advance, where and when the work is ready for testing. Should any work be covered without testing or acceptance, it shall be, if so ordered, uncovered at the Contractor's expense.

C. Inspections will be required for the following at a minimum:

1. Pre-construction meeting.

2. System layout.

3. Pressure test of irrigation mainline (Four hours at 125 PSI or 120% of static water pressure, whichever is greater.) Mainline pressure loss during test shall not exceed 2 PSI.

4. Coverage test of irrigation system. Test shall be performed prior to any planting.

5. Final inspection prior to start of maintenance period.

6. Final acceptance prior to turnover.

D. Site observations and testing will not commence without the field record drawings as prepared by the Irrigation Contractor. Record drawings must be complete and up to date for each site visit.

E. Work that fails testing and is not accepted will be retested. Hourly rates and expenses of the Landscape Architect, City's authorized representative, and governing agencies for re-inspection or retesting will be paid by the Irrigation Contractor at no additional expense to City.

1.9 STORAGE AND HANDLING

A. Use all means necessary to protect irrigation system materials before, during, and after installation and to protect the installation work and materials of all other trades. In the event of damage, immediately make all repairs and replacements necessary to the acceptance of the Landscape Architect and City and at no additional cost to the City.

B. Exercise care in handling, loading, unloading, and storing plastic pipe and fittings under cover until ready to install. Transport plastic pipe only on a vehicle with a bed long enough to allow the pipe to lay flat to avoid undue bending and concentrated external load.

1.10 CLEANUP AND DISPOSAL

A. Dispose of waste, trash, and debris in accordance with applicable laws and ordinances and as prescribed by authorities having jurisdiction. Bury no such waste material and debris on the site. Burning of trash and debris will not be permitted. The Contractor shall remove and dispose of rubbish and debris generated by his work and workmen at frequent intervals or when ordered to do so by the City's authorized representative.

B. At the time of completion the entire site will be cleared of tools, equipment, rubbish and debris which shall be disposed of off-site in a legal disposal area.

1.11 TURNOVER ITEMS

A. Record Drawings:

1. Record accurately on one set of drawings all changes in the work constituting departures from the original contract drawings and the actual final installed locations of all required components as shown below.

2. The record drawings shall be prepared to the satisfaction of the City. Prior to final inspection of work, submit record drawings to the Landscape Architect or City's authorized representative.

3. All record drawings shall be prepared using AutoCAD 2016 drafting software and the original irrigation drawings as a base. No manual drafted record drawings shall be acceptable. The Contractor may obtain digital base files from the Landscape Architect or City's authorized representative.

4. If the Contractor is unable to provide the AutoCAD drafting necessary for the record drawings the irrigation designer does provide record drawing drafting as a separate service.

5. Prior to final inspection of work, submit record drawings plotted onto vellum sheets for review by the Landscape Architect or City's authorized representative. After acceptance by the Landscape Architect, City Inspector or City’s authorized

representative re-plot the record drawings onto reproducible Mylar sheets. The Contractor shall also provide record drawing information on a digital AutoCAD Release 2016 drawing file. All digital files shall be provided on a compact disc (CD) clearly marked with the project name, file descriptions and date.

a. Record drawing information and dimensions shall be collected on a day-to-day basis during the installation of the pressure mainline to fully indicate all routing locations and pipe depths. Locations for all other irrigation equipment shall be collected prior to the final inspection of the work.

b. Two dimensions from two permanent points of reference such as buildings, sidewalks, curbs, streetlights, hydrants, etc. shall be shown for each piece of irrigation equipment shown below. Where multiple components are installed with no reasonable reference point between the components, dimensioning may be made to the irrigation equipment. All irrigation symbols shall be clearly shown matching the irrigation legend for the drawings. All lettering on the record drawings shall be minimum 1/8 inch in size.

6. Show locations and depths of the following items:

a. Point of connection (including water POC, basket strainer, master control valves, flow sensors, etc.)

b. Routing of sprinkler pressure main lines (dimensions shown at a maximum of 100 feet along routing)

c. Isolation valves

d. Automatic remote control valves (indicate station number and size)

e. Quick coupling valves

f. Drip air relief and flush valves

g. Routing of control wires where separate from irrigation mainline

h. Irrigation controllers (indicate controller number and station count)

i. Related equipment (as may be directed)

B. Controller Charts:

1. Provide one controller chart for each automatic controller. Chart shall show the area covered by the particular controller. The areas covered by the individual control valves shall be indicated using colored highlighter pens. A minimum of six individual colors shall be used for the controller chart unless less than six control valves are indicated.

2. Landscape Architect or City's authorized representative must approve record drawings before controller charts are prepared.

3. The chart is to be a reduced copy of the actual "record" drawing. In the event the controller sequence is not legible when the drawing is reduced, it shall be enlarged to a readable size.

4. When completed and approved, the chart shall be hermetically sealed between two pieces of plastic, each piece being a minimum 20 mils in thickness.

C. Operation and Maintenance Manuals:

1. Two individually bound copies of operation and maintenance manuals shall be delivered to the Landscape Architect or City's authorized representative at least 10 calendar days prior to final inspection. The manuals shall describe the material installed and the proper operation of the system.

2. Each complete, bound manual shall include the following information:

3. Index sheet stating Contractor's address and telephone number, duration of guarantee period, list of equipment including names and addresses of local manufacturer representatives.

a. Operating and maintenance instructions for all equipment.

b. Spare parts lists and related manufacturer information for all equipment.

D. Equipment:

1. Supply as a part of this contract the following items:

a. Two (2) wrenches for disassembly and adjustment of each type of sprinkler head used in the irrigation system.

b. Three 30-inch sprinkler keys for manual operation of control valves.

c. Two keys for each automatic controller.

d. Two quick coupler keys with a 1" bronze hose bib, bent nose type with hand wheel and two coupler lid keys.

e. One valve box cover key or wrench.

f. Six extra sprinkler heads of each size and type.

g. For specified ball valves if required: One (1) 5-foot long valve handle, to fit the specified ball valves.

2. The above equipment shall be turned over to City's authorized representative at the final inspection.

1.12 COMPLETION

A. At the time of the pre-maintenance period inspection, the Landscape Architect, City's authorized representative, and governing agencies will inspect the work, and if not accepted, will prepare a list of items to be completed by the Contractor. Punch list to be checked off by contractor and submitted to Landscape Architect or City's authorized representative prior to any follow-up meeting. This checked off list to indicate that all punch list items have been completed. At the time of the post-maintenance period or final inspection the work will be re-inspected and final acceptance will be in writing by the Landscape Architect, City's authorized representative, and governing agencies.

B. The City's authorized representative shall have final authority on all portions of the work.

C. After the system has been completed, the Contractor shall instruct City's authorized representative in the operation and maintenance of the irrigation system and shall furnish a complete set of operating and maintenance instructions.

D. Any settling of trenches which may occur during the one-year period following acceptance shall be repaired to the City's satisfaction by the Contractor without any additional expense to the City. Repairs shall include the complete restoration of all damage to planting, paving or other improvements of any kind as a result of the work.

1.13 GUARANTEE

A. The entire sprinkler system, including all work done under this contract, shall be unconditionally guaranteed against all defects and fault of material and workmanship, including settling of backfilled areas below grade, for a period of one (1) year following the filing of the Notice of Completion.

B. Should any problem with the irrigation system be discovered within the guarantee period, it shall be corrected by the Contractor at no additional expense to City within ten (10) calendar days of receipt of written notice from City. When the nature of the repairs as determined by the City constitute an emergency (i.e. broken pressure line) the City may proceed to make repairs at the Contractor's expense. Any and all damages to existing improvement resulting either from faulty materials or workmanship, or from the necessary repairs to correct same, shall be repaired to the satisfaction of the City by the Contractor, all at no additional cost to the City.

C. Guarantee shall be submitted on Contractors own letterhead as follows:

GUARANTEE FOR SPRINKLER IRRIGATION SYSTEM

We hereby guarantee that the sprinkler irrigation system we have furnished and installed is free from defects in materials and workmanship, and the work has been completed in accordance

with the drawings and specifications, ordinary wear and tear and unusual abuse, or neglect excepted. We agree to repair or replace any defective material during the period of one year from date of filing of the Notice of Completion and also to repair or replace any damage resulting from the repairing or replacing of such defects at no additional cost to the City. We shall make such repairs or replacements within 10 calendar days following written notification by the City. In the event of our failure to make such repairs or replacements within the time specified after receipt of written notice from City, we authorize the City to proceed to have said repairs or replacements made at our expense and we will pay the costs and charges therefore upon demand.

PROJECT NAME:

PROJECT LOCATION:

CONTRACTOR NAME:

ADDRESS:

TELEPHONE:

SIGNED:

DATE:

PART 2 - PRODUCTS

2.1 SUMMARY

Use only new materials of the manufacturer, size and type shown on the drawings and specifications. Materials or equipment installed or furnished that do not meet Landscape Architect's, City's, or governing agencies standards will be rejected and shall be removed from the site at no expense to the City.

2.2 PIPE

A. Pressure supply line between the water meter and the basket strainer shall be type K copper, one size larger than basket strainer device.

B. Pressure supply lines 2 inches in diameter and up to 3 inches in diameter downstream of basket strainer assembly shall be Class 315 solvent weld PVC. Piping shall conform to ASTM D2241.

C. Non-pressure lines 3/4 inch in diameter and larger downstream of the remote control valve shall be SCH 40 solvent weld PVC conforming to ASTM D1785.

D. Recycled water PVC pipe to be color-coded purple in color marked on two sides with recycled water warning statements “Caution-Recycled Water”. Recycled water piping must be accepted by the local recycled water governing agencies.

2.3 METAL PIPE AND FITTINGS

A. Brass pipe shall be 85 percent red brass, ANSI, IPS Standard 125 pounds, Schedule 40 screwed pipe.

B. Fittings shall be medium brass, screwed 125-pound class.

C. Copper pipe and fittings shall be Type "K" sweat soldered, or brazed as indicated on the drawings.

2.4 PLASTIC PIPE AND FITTINGS

A. Pipe shall be marked continuously with manufacturer's name, nominal pipe size, schedule or class, PVC type and grade, National Sanitation Foundation approval, Commercial Standards designation, and date of extrusion.

B. All plastic pipe shall be extruded of an improved PVC virgin pipe compound in accordance with ASTM D2672, ASTM D2241 or ASTM D1785.

C. All solvent weld PVC fittings shall be standard weight Schedule 40 (and Schedule 80 where specified on the irrigation detail sheet, all mainline fittings shall be Schedule 80 PVC) and shall be injection molded of an improved virgin PVC fitting compound. Slip PVC fittings shall be the "deep socket" bracketed type. Threaded plastic fittings shall be injection molded. All tees and ells shall be side gated. All fittings shall conform to ASTM D2464 and ASTM D2466.

D. All threaded nipples shall be standard weight Schedule 80 with molded threads and shall conform to ASTM D1785.

E. All solvent cementing of plastic pipe and fittings shall be a two-step process, using primer and solvent cement applied per the manufacturer's recommendations. Cement shall be of a fluid consistency, not gel-like or ropy. Solvent cementing shall be in conformance with ASTM D2564 and ASTM D2855.

F. When connection is plastic to metal, female adapters shall be hand tightened, plus one turn with a strap wrench. Joint compound shall be non-lead base Teflon paste, tape, or equal.

G. All pressure mainlines installed with solvent weld PVC fittings shall be installed with concrete thrust blocking at all directional changes in the mainline routing. Concrete thrust blocking shall not be required when ductile iron fittings and mechanical restraints are specified.

2.5 BASKET STRAINER ASSEMBLY

A. The basket strainer assembly shall be of the manufacturer, size, and type indicated on the drawings.

B. The basket strainer assembly shall be installed in accordance with the requirements set forth by local codes.

C. The basket strainer assembly shall be of the manufacturer, size, and type indicated on the drawings.

2.6 VALVES

A. Ball Valves:
1. Ball valves shall be of the manufacturer, size, and type indicated on the drawings.
2. All ball valves shall have a minimum working pressure of not less than 150 PSI and shall conform to AWWA standards.

B. Quick Coupler Valves:
1. Quick coupler valves shall be of the manufacturer, size, and type indicated on the drawings.
2. Quick coupler valves shall be brass with a wall thickness guaranteed to withstand normal working pressure of 150 psi without leakage. Valves shall have 1” female threads opening at base, with two-piece body. Valves to be operated only with a coupler key, designed for that purpose. Coupler key is inserted into valve and a positive, watertight connection shall be made between the coupler key and valve.
3. Vinyl quick coupler cover to be purple in color with the words “Warning-Recycled Water-Do Not Drink” permanently marked on lid.

C. Automatic Control Valves:
1. Automatic control valves shall be of the manufacturer, size, and type indicated on the drawings.
2. Automatic control valves shall be electrically operated.
3. Provide Christy's valve ID tags for each remote control valve with valve number.

2.7 VALVE BOXES

A. Valve boxes shall be fabricated from a durable, weather-resistant plastic material resistant to sunlight and chemical action of soils.

B. The valve box cover shall be green in color and secured with a hidden latch mechanism or bolts.

C. The cover and box shall be capable of sustaining a load of 1,500 pounds.

D. Valve box extensions shall be by the same manufacturer as the valve box.

E. The plastic irrigation valve box cover shall be an overlapping type.

F. Automatic control valve, master valve, and flow sensor boxes shall be 17"x11"x12" 'nominal' rectangular size. Valve box covers shall be marked "RCV" with the valve identification number, or "MV", "FS" "heat branded" onto the cover in 1-1/4 inch high letters / numbers.

G. Drip air relief valve boxes shall be 6" circular size. Valve box covers shall be marked with "ARV" "heat branded" onto the cover in 1-1/4 inch high letters.

H. Quick coupler and ball valve boxes shall be 10" circular size. Valve box covers shall be marked with "QCV" or "BV" "heat branded" onto the cover in 1-1/4 inch high letters.

I. Valve box cover shall be green in color and permanently marked (attached tags are not acceptable) on valve box cover plate with the words "Warning-Recycled Water-Do Not Drink".

2.8 AUTOMATIC CONTROLLER

A. Automatic controller shall be of the manufacturer, size, and type indicated on the drawings.

B. Controller enclosure shall be of the manufacturer, size, and type indicated on the drawings.

C. Controller shall be grounded according to local codes using equipment of the manufacturer, size, and type indicated on the drawings; or as required by local codes and ordinances.

2.9 ELECTRICAL

A. All electrical equipment shall be NEMA Type 3, waterproofed for exterior installations.

B. All electrical work shall conform to local codes and ordinances.

2.10 LOW VOLTAGE CONTROL WIRING

A. Remote control wire shall be direct-burial AWG-UF type, size as indicated on the drawings, and in no case smaller than 14 gauge.

B. Remote control wire shall be 14 AWG solid core twisted pair, type as indicated on the irrigation drawings.

C. Connections shall of the manufacturer, size, and type indicated on the drawings.

D. Common wires shall be white in color. Control wires shall be red (where two or more controllers are used, the control wires shall be a different color for each controller. These colors shall be noted on the "Record Drawings" plans located on controller door).

E. Ground wires shall be green in color or bare copper and in no case smaller than 6 gauge.

2.11 IRRIGATION HEADS AND DRIP EMITTERS AND INLINE DRIP TUBING

A. Irrigation heads, drip emitters and inline drip tubing shall be of the manufacturer, size, type, with radius of throw, operating pressure, and discharge rate indicated on the drawings.

B. Irrigation heads, drip emitters and inline drip tubing shall be used as indicated on the drawings.

C. Irrigation heads shall have purple recycled water warning cover.

2.12 DRIP IRRIGATION EQUIPMENT

Drip tubing equipment such as flush valves, air relief valves, wye strainers and pressure regulators shall be of the manufacturer, size, and type indicated on the drawings.

2.13 MISCELLANEOUS EQUIPMENT

A. Landscape Fabric:
   1. Landscape fabric for valve box assemblies shall be 5.0- oz. weight woven polypropylene weed barrier. Landscape fabric shall have a burst strength of 225 PSI, a puncture strength of 60 lbs. and capable of water flow of 12 gallons per minute per square foot.
   2. Type: DeWitt Pro 5 Weed Barrier or approved equal.

B. Equipment such as flow sensors, rain sensors, flush valves, air relief valves, wye strainers, and master valves shall be of the manufacturer, size and type indicated on the drawings.

PART 3 - EXECUTION

3.1 SITE CONDITIONS

A. Inspections:
1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that irrigation system may be installed in strict accordance with all pertinent codes and regulations, the original design, the referenced standards, and the manufacturer's recommendations.

B. Discrepancies:
1. In the event of discrepancy, immediately notify the Landscape Architect or City's authorized representative.
2. Do not proceed with installation in areas of discrepancy until all discrepancies have been resolved.

C. Grades:
1. Before starting work, carefully check all grades to determine that work may safely proceed, keeping within the specified material depths with respect to finish grade.
2. Final grades shall be accepted by the Engineer before work on this section will be allowed to begin.

D. Field Measurements:
1. Make all necessary measurements in the field to ensure precise fit of items in accordance with the original design. Contractor shall coordinate the installation of all irrigation materials with all other work.
2. All scaled dimensions are approximate. The Contractor shall check and verify all size dimensions prior to proceeding with work under this section.
3. Exercise extreme care in excavating and working near existing utilities. Contractor shall be responsible for damages to utilities, which are caused by his operations or neglect.

E. Diagrammatic Intent:

The drawings are essentially diagrammatic. The size and location of equipment and fixtures are drawn to scale where possible. Provide offsets in piping and changes in equipment locations as necessary to conform with structures and to avoid obstructions or conflicts with other work at no additional expense to City.

F. Layout:
1. Prior to installation, the Contractor shall stake out all pressure supply lines, routing and location of sprinkler heads, valves, basket strainer, and automatic controller.
2. Layout irrigation system and make minor adjustments required due to differences between site and drawings. Where piping is shown on drawings under paved areas, but running parallel and adjacent to planted areas, install the piping in the planted areas.

G. Water Supply:

Connections to, or the installation of, the water supply shall be at the locations shown on the drawings. Minor changes caused by actual site conditions shall be made at no additional expense to City.

H. Electrical Service:
1. Connections to the electrical supply shall be at the locations shown on the drawings. Minor changes caused by actual site conditions shall be made at no additional expense to City.
2. Contractor shall make electrical connections to the irrigation controller. Electrical power source to controller locations shall be provided by others.
3. Contractor shall make electrical connections to the irrigation controller. 230-volt single-phase electrical power source to pump assembly location shall be provided by others per NEC codes.

3.2 TRENCHING

A. Excavations shall be straight with vertical sides, even grade, and support pipe continuously on bottom of trench. Trenching excavation shall follow layout indicated on drawings to the depths below finished grade and as noted. Where lines occur under paved area, these dimensions shall be considered below subgrade.

B. Provide minimum cover of 18 inches on pressure supply lines 2 ½ inches and smaller.

C. Provide minimum cover of 18 inches for control wires within planters.

D. Provide minimum cover of 24 inches for control wires within sleeves below paving.

E. Provide minimum cover of 36 inches on pressure supply lines under vehicular travel ways.

F. Provide minimum cover of 12 inches for non-pressure lines.

G. Pipes installed in a common trench shall have a 4-inch minimum space between pipes.

3.3 THRUST BLOCKS

A. Thrust blocks must be constructed of Class “B” concrete.

B. Thrust blocks shall be poured against undisturbed site soil.

C. PVC fitting joints shall be kept free of concrete. Do not encase fitting in concrete.

D. Thrust blocking shall be sized to provide the minimum bearing areas as shown below. Bearing areas indicated have been calculated for Class 200 PVC pipe at a test pressure of 150 PSI in soil with 2,000 PSI bearing capacity. Increase thrust block sizing as necessary for varying soil conditions.

1. Provide a minimum thrust block bearing area of 2.0 square feet on all bends (all degrees) and tees installed on pressure supply lines 4 inches and smaller.

3.4 BACKFILLING

A. Backfill material on all lines shall be the same as adjacent soil free of debris, litter, and rocks over 1/2 inches in diameter.

B. Backfill shall be tamped in 4-inch layers under the pipe and uniformly on both sides for the full width of the trench and the full length of the pipe. Backfill materials shall be sufficiently damp to permit thorough compaction, free of voids. Backfill shall be compacted to dry density equal to adjacent undisturbed soil and shall conform to adjacent grades.

C. Flooding in lieu of tamping is not allowed.

D. Under no circumstances shall truck wheels be used to compact backfill.

E. Provide sand backfill a minimum of 4 inches over and under all piping under paved areas.

3.5 PIPING

A. Piping under existing pavement may be installed by jacking, boring, or hydraulic driving. No hydraulic driving is permitted under asphalt pavement.

B. Cutting or breaking of existing pavement is not permitted.

C. Carefully inspect all pipe and fittings before installation, removing dirt, scale, burrs, and reaming. Install pipe with all markings up for visual inspection and verification.

D. Remove all dented and damaged pipe sections.

E. All lines shall have a minimum clearance of 4 inches from each other and 12 inches from lines of other trades.

F. Parallel lines shall not be installed directly over each other.

G. In solvent welding, use only the specified primer and solvent cement and make all joints in strict accordance with the manufacturer's recommended methods including wiping all excess solvent from each weld. Allow solvent welds at least 15 minutes setup time before moving or handling and 24 hours curing time before filling.

H. PVC pipe shall be installed in a manner, which will provide for expansion and contraction as recommended by the pipe manufacturer.

I. Center load all plastic pipe prior to pressure testing.

J. All threaded plastic-to-plastic connections shall be assembled using Teflon tape or Teflon paste.

K. For plastic-to-metal connections, work the metal connections first. Use a non-hardening pipe dope an all threaded plastic-to-metal connections, except where noted otherwise. All plastic-to-metal connections shall be made with plastic male adapters.

3.6 CONTROLLER

A. The exact location of the controller shall be approved by the Landscape Architect or City's authorized representative before installation. The electrical service shall be coordinated with this location.

B. The Irrigation Contractor shall be responsible for the final electrical hook up to the irrigation controller.

C. The irrigation system shall be programmed to operate during the periods of minimal use of the design area.

3.7 CONTROL WIRING

A. Low voltage control wiring shall occupy the same trench and shall be installed along the same route as the pressure supply lines whenever possible.

B. Where more than one wire is placed in a trench, the wiring shall be taped together in a bundle at intervals of 10 feet. Bundle shall be secured to the mainline with tape at intervals of 20 feet.

C. All connections shall be of an approved type and shall occur in a valve box. Provide an 18-inch service loop at each connection.

D. An expansion loop of 12 inches shall be provided at each wire connection and/or directional change, and one of 24 inches shall be provided at each remote control valve.

E. A continuous run of wire shall be used between a controller and each remote control valve. Under no circumstances shall splices be used without prior approval.

3.8 VALVES

A. Automatic control valves, quick coupler, and ball valves are to be installed in the approximate locations indicated on the drawings.

B. Valve shall be installed in shrub areas whenever possible.

C. Install all valves as indicated in the detail drawings.

D. Valves to be installed in valve boxes shall be installed one valve per box.

E. Provide valve ID tags for each remote control valve with valve number.

3.9 VALVE BOXES

A. Valve boxes shall be installed in shrub areas whenever possible.

B. Each valve box shall be installed on a foundation of 3/4 inch gravel backfill, 3 cubic feet minimum. Valve boxes shall be installed with their tops 1/2 inch above the surface of surrounding finish grade in lawn areas and 2 inches above finish grade in ground cover areas.

3.10 IRRIGATION HEADS DRIP EMITTERS AND INLINE DRIP TUBING

A. Irrigation heads, drip emitters and inline drip tubing shall be installed as indicated on the drawings.

B. Spacing of heads and inline drip tubing shall not exceed maximum indicated on the drawings.

C. Riser nipples shall be of the same size as the riser opening in the sprinkler body.

3.11 BASKET STRAINER ASSEMBLY

A. Basket strainer assembly shall be installed as indicated on the drawings. The basket strainer assembly shall be installed in accordance with the requirements set forth by local codes.

B. The exact location of the basket strainer shall be approved by the Landscape Architect or city's authorized representative before installation.

3.12 MISCELLANEOUS EQUIPMENT

A. Install all assemblies specified herein according to the respective detail drawings or specifications, using best standard practices.

B. Quick coupler valves shall be set approximately 18 inches from walks, curbs, header boards, or paved areas where applicable.

C. Install devices such as rain sensors, flush valves, and air relief valves, master valves and flow sensors as indicated on the drawings and as recommended by the manufacturer.

3.13 FLUSHING THE SYSTEM

A. Prior to installation of irrigation heads, the valves shall be opened and a full head of water used to flush out the lines and risers.

B. Irrigation heads shall be installed after flushing the system has been completed.

3.14 ADJUSTING THE SYSTEM

A. Contractor shall adjust valves, align heads, and check the coverage of each system prior to coverage test.

B. If it is determined by the Landscape Architect or City's authorized representative that additional adjustments or nozzle changes will be required to provide proper coverage, all necessary changes or adjustments shall be made prior to any planting.

C. The entire system shall be operating properly before any planting operations commence.

D. Automatic control valves are to be adjusted so that the irrigation heads, drip emitters and inline drip tubing operate at the pressure recommended by the manufacturer.

3.15 TESTING AND OBSERVATION

A. Do not allow or cause any of the work of this section to be covered up or enclosed until it has been observed, tested and accepted by the Landscape Architect, City, and governing agencies.

B. The Contractor shall be solely responsible for notifying the Landscape Architect, City, and governing agencies, a minimum of 48 hours in advance, where and when the work is ready for testing.

C. When the sprinkler system is completed, the Contractor shall perform a coverage test of each system in its entirety to determine if the water coverage for the planted areas is complete and adequate in the presence of the Landscape Architect.

D. The Contractor shall furnish all materials and perform all work required to correct any inadequacies of coverage due to deviations from the plans, or where the system has been willfully installed as indicated on the drawings when it is obviously inadequate, without bringing this to the attention of the Landscape Architect. This test shall be accepted by the Landscape Architect and accomplished before starting any planting.

E. Areas to be maintained for the formal maintenance period shall start maintenance at the same time, as directed by the Landscape Architect, City, and governing agencies. Partial areas will not be released into maintenance prior to completion of items listed in the pre-maintenance review. The maintenance period may not be phased.

F. If, after the maintenance review, the irrigation systems are not accepted by the Landscape Architect, the contractor shall reimburse the Architect for additional site visits, or additional time required to review work. All additional time will be billed at the Architect’s hourly rate and will be paid for by the contractor at no additional cost to the city.

G. Final inspection will not commence without record drawings as prepared by the Irrigation Contractor.

3.16 MAINTENANCE

During the maintenance period the Contractor shall adjust and maintain the irrigation system in a fully operational condition providing complete irrigation coverage to all intended plantings.

3.17 COMPLETION CLEANING

Clean up shall be made as each portion of the work progresses. Refuse and excess dirt shall be removed from the site, all walks and paving shall be swept, and any damage sustained on the work of others shall be repaired to original conditions.

END OF SECTION 328400

SECTION 32 92 01

HYDROMULCH SEEDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Hydromulch the seed mix in two phases of application to include an initial hydroseed application of seed, fertilizer, fiber mulch and mycorrhizal inoculum; and a secondary hydroseed application of fiber mulch and M-Binder top dressing, complete as shown and as specified.

B. Related Sections:

1. Division 01 Section “Sustainable Design Requirements” for LEED requirements and submittals.
2. Section 32 84 00 Landscape Irrigation
3. Section 32 93 00 Plants

1.2 SUBMITTALS

A. Procedure: In accordance with Division 1.

B. Data: Manufacturer data for items specified herein, and samples as follows:

1. Seed Mix.
2. Mulch and M-Binder.
3. Delayed Release Fertilizer.
4. Mycorrhizal Inoculum.
5. Delivery Slips.
6. Certificates of Inspection: Provide as required by law for transportation of each shipment of seed along with invoice. Submit copies of certificates after acceptance of material. Inspection by Federal or State Governments at place of growth does not preclude rejection at project site.

1.3 QUALITY ASSURANCE

A. Standards: Apply the current or latest editions of the standards for seed as described in the following:

1. Hortus III - 1976 Edition, Bailey Horatorium, Cornell University.

1.4 JOB CONDITIONS

A. Protection of Existing Plants to Remain: See Section 32 93 00 - Plants.

1.5 WORK SCHEDULE: Seeding period to occur October through February only. Hydroseed will be unsuccessful outside of the this time period. Contractor responsible to coordinate construction schedule and required site preparation is met to meet hydroseeding time period.

1.6 SELECTION AND ORDERING OF PLANT MATERIAL

A. Documentation: Submit documentation within 30 days after award of Contract that all seed has been ordered. Provide supplier, list of mixes and quantity.

B. Unavailable Materials: If proof is submitted that any seed specified is not obtainable, a proposal will be considered for use of the nearest equivalent variety with corresponding adjustment of Contract price. Substantiate such proof in writing no later than 30 days after award of contract.

C. Special Conditions: The above provisions shall not relieve Contractor of the responsibility for obtaining specified seed in advance if special growing conditions or other arrangements must be made in order to supply specified materials.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Seed:

1. Delivery: Furnish standard seed in unopened manufacturer's standard containers bearing original certification labels showing quantity, analysis and name of manufacturer.

2. Storage: Store seed with protection from weather or other conditions which would damage or impair the effectiveness of the product.

B. Mulch: Store with protection from weather or other conditions which would damage or impair the effectiveness of the product.

1.8 ANALYSES OF SAMPLES AND TESTS

A. Samples: Landscape Architect reserves the right to take and analyze samples of materials for conformity to specifications at any time. Furnish samples upon request.

B. Rejected Materials: Remove rejected materials immediately from the site at Contractor's expense. Pay cost of testing of materials not meeting specifications.

1.9 MAINTENANCE: See Section 32 93 00 – Plants.

1.10 WARRANTY PERIOD

A. Time Period: Warrant that all hydromulch seeded areas shall be in a healthy and flourishing condition of active growth six months from date of Final Acceptance.

B. Appearance During Warranty: All germinated plants shall be free of dead or dying patches, and all areas shall show foliage of a normal density, size and color.

C. Delays: All delays in completion of planting operations which extend the planting into more than one planting season shall extend the Warranty Period correspondingly.

D. Coverage: Warrant growth and coverage of hydroseeded planting to the effect that a minimum of 95% of the area planted shall be covered with specified planting after one growing season with no bare spots greater than two square feet.

E. Exceptions: Contractor shall not be held responsible for failures due to neglect by City, vandalism, etc., during Warranty Period. Report such conditions in writing.

1.11 REPLACEMENTS

A. Unacceptable Workmanship: Hydroseed areas exhibiting conditions which are determined as unacceptable workmanship shall be repaired and/or replaced at no additional cost to the City.

B. Replacements: Replace, without cost to City, and as soon as weather conditions permit, all hydroseed areas not in a vigorous, thriving condition, as determined by Landscape Architect during and at the end of Warranty Period.

C. Matching: Closely match all replacement seed with adjacent areas of hydroseed planting. Apply all requirements of this Specification to all replacements.

PART 2 - PRODUCTS

2.1 HYDROSEED MIXES

A. Native Hydroseed Mix:

Atriplex Lentiformis Lenfiformis
Atriplex Lentiformis
Camissonia Cheiranthifolia
Isocoma Menziesii
Oenothera Elata Hookerii
Baccharis Sarothroides
Plantago Erecta
Artemisia Californica
Eriogonum Fasciculatum
Salvia Mellifera
Baccharis Pilularis
Heliotropium Curassavicum
Atriplex Canescens
Lotus Scoparius Ssp Scoparius

Ambrosia Psilostachya

B. Supplier: S & S Seeds, P.O, Box 1275, Carpinteria, California 93013. Tel. (805) 684-0436; or approved equal.

2.2 MULCH

A. General:

1. Composition: Green-colored, fibrous, virgin wood cellulose mulch containing no growth or germination-inhibiting factors.
2. Dispersion in Slurry: Mulch shall be manufactured in such manner that after addition to and agitation in slurry tanks with fertilizer, seed, water and other approved additives, fibers in the material will become uniformly suspended to form a homogeneous slurry.
3. Absorption Capacity: When hydraulically sprayed on the ground, the material will form a blotter-like groundcover impregnated uniformly with seed which will allow the absorption of moisture and allow rainfall to percolate to the underlying soil.

B. Specifications:

1. Weight: Weight specifications of this material from suppliers, and for all applications, shall refer only to air dry weight of the fiber material. Absolute air dry weight is based on the normal standards of the Technical Association of the Pulp and Paper Industry for wood cellulose and is considered equivalent to 10% moisture.
2. Labeling: Each package of the cellulose fiber shall be marked by the manufacturer to show the air dry weight content.

2.3 ERER OSION CONTROL

A. Type: Flexterra® HP-FGM™.

B. Supplier: S & S Seeds, P.O, Box 1275, Carpinteria, California 93013. Tel. (805) 684-0436; or approved equal.

2.4 HYDRAULIC EQUIPMENT FOR HYDROSEEDING

A. Mixer: Use a commercial type hydro-seeder for the application of slurry. Equipment shall have a built-in agitation system with an operating capacity sufficient to agitate, suspend and homogenously mix slurry.

B. Distribution Lines: Large enough to prevent stoppage and to provide even distribution of the slurry over the ground.

C. Pump Capacity: 150 psi at the nozzle.

D. Slurry Tank: Minimum capacity of 1000 gallons and shall be mounted on a traveling unit which will place the slurry tank and spray nozzles within sufficient proximity to the areas to be seeded so as to provide uniform distribution without waste.

2.5 WATER: Transport as required.

2.6 HYDROSEEDING MIX

A. Phase I Hydroseed Application: Seeding rate: per planting legend.

1,500-2,500 lbs/acre	Conwed 1000 Wood Fiber Hydraulic Mulch
1,000 lbs/acre	Hydropost Premium compost
150 lbs/acre	Ecology Control M-Binder/Tack
800 lbs/acre	Biosol Forte 7-2-1 Organic Fertilizer
60 lbs/acre	Tri-C Soluble Humate
1 lbs/acre	See Mix Per Plan

B. Supplier: S & S Seeds, P.O, Box 1275, Carpinteria, California 93013. Tel. (805) 684-0436; or approved equal.

2.7 MYCORRHIZAL INOCULUM

A. Type: AM 120 Arbuscular Mycorrhizal Inoculum.

B. Supplier: S & S Seeds, P.O, Box 1275, Carpinteria, California 93013. Tel. (805) 684-0436; or approved equal.

2.8 DELAYED RELEASE (DR) FERTILIZER

A. Type: (22-7-11 + Minors).

B. Manufacturer: Reforestation Technologies International. 1341 Dayton Street, Suite G. Salinas, California 93901. Tel. (800) 784-4769; or approved approved equal.

PART 3 - EXECUTION

3.1 GENERAL

A. Areas to Receive Hydroseeding: All areas as shown on the drawings.

B. Scheduling: Perform seeding on a section by section basis. Complete embankments and slopes in a continuous manner.

3.2 WEED ABATEMENT

A. Spray out existing grasses, weeds, etc. with herbicide and remove all dead material including root systems prior to soil preparation. After removal of existing grasses/weeds, repeat herbicide treatment two (2) more times, allowing 6 weeks germination time between treatments, to eliminate all existing weeds and grasses.

3.3 SOIL PREPARATION

A. Verification:
   1. Stones, Weeds, Debris: Verify that all areas to receive hydroseeding are clear of stones larger than 6 in. diameter, exotic invasive weeds, debris and other extraneous materials.
   2. Grades: Verify that grades are within 2 in. plus or minus of the required finished grades. Verify that fertilization and erosion control materials have been installed in another section. Report all variations in writing.

B. Soil Moisture:
   1. Excessive Moisture: Do not commence work of this section when soil moisture content is so great that excessive compaction will occur, nor when it is so dry that dust will form in air or that clods will not break readily.
   2. Inadequate Moisture: Apply water, as necessary, to bring soil to optimum moisture content for planting.

3.4 SITE PREPARATION

A. All landscape elements such as: metal edging, DG path, stone benches, rip-rap and boulders to be in place prior to hydroseeding.

B. Mask off DG path, rip-rap and adjacent landscape area not receiving hydroseed to prevent cross seeding. Hand seeding may be required along edge to ensure clean and clear delineation between hyroseed mixes.

C. Contractor to present installation method for approval to Landscape Architect prior to commencement of work.

3.5 HYDROSEEDING

A. Preparation: Do all slurry preparation at the job site.
   1. Water: Add water to the tank when the engine is at half throttle. When the water level has reached the height of the agitator shaft, establish good re-circulation and add seed.
   2. Seed: Do not allow seed to remain more than 30 min. in slurry.

3. Fertilizer: Add fertilizer, followed by the mulch. The mulch shall only be added to the mixture after the seed, and when the tank is at least 1/3 filled with water.
4. Mixing: Open the engine throttle to full speed when the tank is half-filled with water. Add all the mulch by the time the tank is 2/3 to 3/4 full. Commence spraying immediately when the tank is full.

B. Application:

1. General: Apply specified slurry mix in a sweeping motion to form a uniform mat at the specified rate. Keep hydroseeding within designated areas and keep from contact with other plant materials.
2. Two Phase Application Method for Seed Mix:
   a. Phase I: Shoot hydroseed initial application with all of the specified seed mix and fertilizer and mycorrhizal inoculum with 500 lbs. per acre of fiber mulch.
   b. Phase II: Shoot hydroseed top-dress application of 1,500 lbs. fiber mulch and 100 lbs. of M-Binder.
3. Unused Mix: Do not use slurry mixture which has not been applied within 4 hours of mixing. Promptly remove from the site.
4. Protection: After application, do not operate any equipment over the seeded areas.
5. Reseeding: Reseed all areas and parts of areas which fail to show a uniform stand of native planting until all areas are covered with a satisfactory stand of plants.

3.6 CLEAN-UP

A. General: Keep all areas of work clean, neat and orderly at all times. Keep all areas clean during planting operations.
B. Overspray: Immediately after application, thoroughly wash off any plant materials, planting areas, or paved areas not intended to receive slurry mix.
C. Debris: Clean up and remove all deleterious materials and debris from the entire work area prior to Final Acceptance.

PART 1 - END OF SECTION 32 92 10

SECTION 32 93 00

PLANTS

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. Plants
2. Planting soils and soil amendments
3. Landscape Mulches
4. Tree stabilization
5. Landscape edgings
6. Root barrier

B. Related Sections:

1. Division 01 Section "Temporary Tree and Plant Protection" for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work.
2. Division 12 Section "Site Furnishings" for exterior unit planters or ceramic pots.
3. Division 31 Section "Site Clearing" for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
4. Division 31 Section "Earth Moving" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
5. Division 32 Section "Turf and Grasses" for meadow planting, hydroseeding, and erosion-control materials.

6. Division 33 Section "Subdrainage" for below-grade drainage of landscaped areas, paved areas, and wall perimeters.

1.3 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Compost: mixture of various decaying highly organic substances such as dead leaves, but free of animal wastes, used to improve soil structure and provide nutrients.

C. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

D. Date of Acceptance: Date at the end of the warranty periods (as specified herein) when written acceptance is provided by the City.

E. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

F. Finish Grade: Elevation of finished surface of planting soil (not mulch) within 1/10th of an inch. Unless other wise noted soil finish shall be:

1. 2 ½" below hardscape /pavement areas

2. 4" below topcut curb or planter wall

3. 1" below hardscape/ pavement areas (at lawn assembly)

G. Manufactured or Import Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

H. Native Planting Areas: Areas to be planted with California Native Plants or covered with mulches not intended for pedestrian or vehicular circulation. Native Planting areas will require special soil preparation and planting procedures to create the ecology necessary for Native Plantings.

I. Native Soil: Existing soil found in place on the site. Soil is defined as the unconsolidated mineral or organic matter on the immediate surface of the earth which serves as a natural medium for the growth of plants.

J. Notice of Completion: The date at the close of the Maintenance Period when the work has been completed, checked, accepted and written approval of the work has been given by the Landscape Architect.

K. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

L. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

M. Planting Area: Areas to be planted or covered with mulches not intended for pedestrian or vehicular circulation.

N. Planting Soil: Existing, in-place surface soil or imported topsoil that is modified with soil amendments and fertilizers per the specifications to produce a soil mixture best for plant growth.

O. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

P. Raised Planter: Planted areas that are bounded by any wall or curb 12” or higher than the adjacent grade or surface. To be filled with import topsoil to the full and complete depth of the planter.

Q. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

R. Soil Amendment: elements added to the soil, such as compost, peat moss, or fertilizer to improve its capacity to support plant life. Such materials are usually intended to improve structure, drainage or aeration, or add nutrients to the soil.

S. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

T. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

U. To Remain: Planting areas identified in the Drawings to be protected and maintained in place.

1.4 SUBMITTALS

A. Submittals for items shall be made in one package. If submittals are judged incomplete or non-responsive to the directions of the Landscape Architect after three (3) submittals, the Contractor shall be back-charged for the Landscape Architect’s costs to process additional Submittals.

B. Submittals will be rejected without the benefit of review by the Landscape Architect if they are difficult to read, incomplete or if the required information in not presented in format required.

C. Product Data:

1. For each type of product listed in Part 2 of this specification.

2. Plant Materials: Include quantities, sizes, quality, and nursery sources for plant materials.

3. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to the Project.

4. Plant Photographs: For each plant specified, include photo quality color photographs at 8 ½ x11 size format of each required species and size of plant material as it will be furnished to the Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. Include a minimum of three photographs of each species. Identify each photograph with the full scientific name of the plant, container size, height and spread, and name of the growing nursery. Review of plant photographs does not indicate acceptance of the plant material as delivered to the Project Site.

5. Planting Schedule: Submit anticipated planting dates for each type of planting.

6. Delivery Slips for all products included in submittal, slips should indicate quantity delivered.

D. Samples for Verification: For each of the following:

1. Compost: ¼ lb bagged sample; in sealed plastic bags labeled with product name and source. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

2. Planting soils: 1 lb bagged sample for each type of soil required; in sealed plastic bags labeled with product name and source. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

3. Organic Mulch: ¼ lb bagged samples of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

4. Mineral Mulch: 1 lb bagged sample of each mineral mulch required, in sealed plastic bags labeled with source of mulch. Sample shall be typical

of the lot of material to be delivered and installed on the site; provide an accurate indication of name, source, size, and color range of the material.

5. Edging Materials and Accessories: Manufacturer's standard size, to verify color selected.

E. Qualification Data: For qualified Landscape Installer and qualified Native Plantings Landscape Subcontractor. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of citys/ contact persons. Refer to the “Quality Assurance” section Part 1 of this specification for additional information.

F. Material Test Reports:

1. Soil Analysis Test Reports: Testing for all planting soils including import Topsoil and existing or stockpiled soil to be used during backfill operations. Refer to Soil Testing section in Part 3 testing procedures. Soil testing shall be completed after rough grading operations. See Part 1 Quality Assurance for additional requirements.

2. Percolation Test Reports: Refer to Percolation Testing section in Part 3 for testing procedures. The results of the percolation testing must be submitted to the Landscape Architect for review and approval.

G. Maintenance Instructions: Contractor shall furnish to the City recommended procedures to be established by City for maintenance of plants during a calendar year. Submit before start of required maintenance periods.

1. Instructions should include but not be limited to the following tasks: Fertilizing, irrigation schedule, dead heading, mulch or other inert groundcover replenishment, pruning of shrubs to maintain design intent and 3 year tree maintenance schedule.

2. Instructions shall be submitted to Landscape Architect for approval before submittal to the City and prior to the expiration of the Maintenance period.

H. Landscape Planting Plan As built Drawings Contractor mark ups.

I. Warranty: Submit written warranties on the Contractor’s or subcontractor’s letterhead, addressed to the City. Submit all warranties in duplicate and in the form shown in the General Conditions, or modified as approved by the Landscape Architect to suit the conditions pertaining to the warranty. Refer to Warranty and Replacement section, Part 1 for more information.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.

1. All work shall be performed by a trained crew in accordance with the standards and practices related to the trade.

2. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.

3. License: Single entity subcontractor holding a valid C-27 California Contractor's license.

4. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

5. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:

   a. Certified Landscape Technician - Exterior, with installation, maintenance and irrigation specialty area(s).

   b. Certified Ornamental Landscape Professional, designated COLP.

6. Pesticide Applicator: State licensed, commercial.

B. Native Planting Landscape Installer Qualifications: All of the work required to be provided as Native Planting as described in this Specification shall be provided by an experienced Native Plant Contractor holding a valid C-27 California contractor's license.

1. The qualified Native Plantings Landscape Installer shall exhibit work that has resulted in successful establishment of California Native Plant Landscapes.

2. Landscape Contractors: Subject to compliance with the requirements, provide California Native Plantings by one of the following or a comparable installer:

   a. California's Own Native Landscape Design: (760) 746-6870
   b. Coastal Sage Gardening: (619) 223-5229
   c. Landscapers Technical Services: (619) 915-6714
   d. RECON (619) 308-9333

C. Soil and Plant-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

1. Provide testing by one of the following or a comparable testing laboratory:

   a. John Deere Landscapes
   b. Waypoint Analytical

c. Wallace Laboratories

D. Soil Analysis Testing: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio (SAR), electrical conductivity (ECe), boron content, deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Supply Testing Agency with a complete copy of this specification and a copy of the project plant list and planting plan at the time of the soil testing.

2. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.

3. The soil-testing laboratory shall oversee soil sampling at the conclusion of rough grading operations; with depth, location, and number of samples to be taken per instructions from Landscape Architect. A minimum of five representative samples (or as listed in the Drawings) shall be taken from varied locations for each soil to be used or amended for planting purposes.

4. No amendments shall be applied prior to receipt of test results.

5. Report suitability of tested soil for plant growth.

   a. Based upon the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. (92.9 sq. m) or volume per cu. yd. (0.76 cu. m) for recommended quantities of soil amendments and fertilizers listed in the specifications to produce satisfactory planting soil suitable for healthy, viable plants.

   b. Testing Agency recommendations must use the soil amendments and fertilizers listed in the specifications in their recommendations.

   c. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

   d. If corrective measures are specified, provide retesting of soils after measures are corrected to confirm soils were successfully abated. Costs for soil testing and retesting after corrective measures are completed shall be including in the base bid price.

6. The Landscape Architect shall recommend all changes to the amendments listed after review of the test results. Cost change for soil preparation shall be in accordance with the provisions in the General Conditions. Amounts of amendments listed in Part 3 shall be used for bidding purposes.

E. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

F. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip.

2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

G. Plant Material Observation: Landscape Architect may elect to observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Landscape Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. The landscape architect may make invasive inspection of the rootball as needed to verify that plants meet the requirements and may require random cutting into the interior of the rootball and or remove or request the removal of the sides of boxes at the nursery or on-site. Such cutting and inspection may render the container plant unsuitable for planting. Findings of the root inspections shall be considered as representative of all plants of that type from said nursery source. Remove rejected trees or shrubs immediately from Project site.

1. Notify Landscape Architect of sources of planting materials fourteen days in advance of delivery to site.

H. Preinstallation Conference: Conduct conference at Project site with the Landscape Architect, Contractor and Landscape subcontractor to review requirements.

1. Meeting minutes from the preinstallation conference shall be the responsibility of the Contractor and shall be distributed to the parties in attendance for review and subsequent approval of conference discussion items.

2. Discussion agenda items during the pre-installation shall include the Contractor's understanding and familiarity with the following:

   a. Protection of existing trees and landscape areas
   b. Contract grown plant material
   c. Site materials and finishes
   d. Required submittals, samples and mock-ups.
   e. Preparation and criteria for generation of the punch list, determination of Notice of Completion and Date of Acceptance.
   f. Soil testing and percolation testing

g. Procedures protocol for site construction observation visits.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants or within driplines of existing trees.

2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

3. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

C. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

D. Handle planting stock by root ball.

E. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Plants shall not be allowed to remain on site longer than 5 days prior to planting.

2. Do not remove container-grown stock from containers before time of planting.

3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

1.7 PROJECT CONDITIONS

A. Field Measurements: Prior to excavation for planting or placing of plant materials, verify actual grade elevations, service and utility locations,

underground and overhead lines, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work. In the vent of a conflict the Contractor shall notify the Landscape Architect and the city.

B. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by City or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:

1. Notify City no fewer than two days in advance of proposed interruption of each service or utility.

2. Do not proceed with interruption of services or utilities without City's written permission.

C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

D. Site Draining: Established site drainage shall be maintained by the Contractor during all phase of the Work. Grade areas as needed to insure proper grades and drainage as indicated on Drawings. Final finish grade shall insure positive drainage with surface drainage away from buildings, walls and toward driveways, drainlets and catch basins.

E. Errors and Omission: Refer to errors and/or discrepancies in or between plans, specifications, lists or notes to eth Landscape Architect for adjustments before proceeding with the Work. The Contractor shall assume responsibility for proceeding with the Work without referring. In the event of a conflict, the Landscape Architect shall interpret the meaning of the Contract Drawings and Contract Specifications and their decision shall be final.

F. Excavation: When conditions detrimental to plant growth are encountered such as rubble fill, adverse drainage conditions or obstructions, cease planting operations and notify the Landscape Architect for further direction.

G. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.8 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Death and unsatisfactory growth, except for defects resulting from incidents that are beyond Contractor's control.
    b. Structural failures including plantings falling or blowing over.
    c. Faulty performance of tree stabilization, edgings, tree grates, improper planting, and failure to water sufficiently.
    d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    e. Damages done to plant material during construction.

2. Warranty Periods from Date of Notice of Completion:

    a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months
    b. Ground Covers, Biennials, Perennials, and Other Plants: 6 months.
    c. Specialty Plants (succulents, tropical plants, bamboo): 24 months
    d. Palm like plants: 24 months
    e. Native Plantings: 30 months

3. Include the following remedial actions as a minimum:

    a. Immediately remove dead plants within 14 days and replace unless required to plant in the succeeding planting season.
    b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
    c. Replacement plants shall be of the same size, species and variety as specified in the Drawings. Replacement includes restoration of surrounding area to match the existing conditions.
    d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

1.9 MAINTENANCE SERVICE

A. Initial Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

    1. Maintenance Period: **180 days** from date of Notice of Completion.

B. Within one week, prior to authorization start of maintenance, submit a Maintenance Schedule to the Landscape Architect listing the days when maintenance crews will be on site. Include a contact person and emergency phone number.

C. The maintenance period shall be extended when in the opinion of the Landscape Architect, dead or dying plant materials, poor or unhealthy growing conditions or improper maintenance practices are evident within the maintenance period. The

extended period shall be provided at no additional cost to the City and shall be extended until the work is complete and acceptable to the Landscape Architect.

1.10 REJECTION AND SUBSTITUTION

A. Products or materials, whether installed or not, not conforming to the requirements herein specified shall be considered defective, and be marked as rejected. Materials shall be removed and replaced with approved materials at no additional cost to the City.

B. Submit written request for each proposed substitution. Provide data substantiating the request as well as a Certificate of Suitability certifying that the proposed substitution is equal or better in all respects to that specified and that it will in all respects perform the function for which it is intended. Include with request all required samples.

1.11 SITE OBSERVATIONS

A. Schedule and coordinate site observation visits for the following construction activities. Reviews shall be performed by the Landscape Architect an notification shall be given in advance notice as noted:

B.

Item	Advance Notice
Protection of existing plant materials	48 hours
Rough grade	48 hours
Soil preparation and finish grade	48 hours
Inspection of plant material delivered on site.	48 hours
Spotting of Trees prior to excavation of planting holes	48 hours
Plant material review	48 hours
Plant layout and installation	48 hours
Substantial Completion Punch List	7 days
Punch List Completion	7 days
Maintenance Completion	7 days

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of weeds, disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than *3/4 inch (19 mm)* in diameter; or with stem girdling or kinked roots will be rejected.

2. Plants shall have normal well-developed, vigorous and fibrous root systems which are neither root, nor container bound.

3. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.

C. Labeling: Label five plants of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant as shown on Drawings.

D. If formal arrangements or consecutive order of plants is shown on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

E. Provide healthy, weed and disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container or stem girdling roots above the root collar. Provide only plants that are acclimated to outdoor conditions before delivery.

F. Plants shall be grown in their container for at least six months, but not over two years.

G. A minimum of three structural roots reasonably distributed around the trunk of the plan shall be found in each plant. Plants with structural roots only on one side of the trunk (J roots) shall be rejected.

H. The root crown must be more than two inches below the soil line. The top two structural roots shall be no more than three inches below the soil line when measured four inches radial to the trunk. The top of the other structural roots shall be no greater than five inches below the soil line when measured four inches radial to the trunk. The grower may request a modification to this requirement for species with roots that rapidly descend, provided that the grower removed all circling roots above or across the top of the structural roots.

I. The plant grower shall be responsible for certifying that the plants have been root pruned at each step in the plant production process to remove stem girdling roots and kinked roots. The plant grower shall certify in writing that all plants are

reasonably free of root defects as defined in this specification and that the tree has been grown and harvested to produce a plant that meets the specifications.

J. Groundcover plants grown in flats shall be healthy vigorous rooted cuttings grown in flats for at least 3 months but not over six months. Plants that have a cracked or broken rootball shall be replaced with the same species, size and character as specified.

K. Succulents: Succulents shall be acquired from a licensed nursery. Succulents shall be free of insects, mottled leaves, broken or split branches or trunks, scarring or any other uncharacteristic growth patterns.

L. Plants that fail to meet any of the above requirements may be rejected by the landscape architect. Additionally, corrective measures to may be taken to fix deficiencies in the plant material if approved by the landscape architect. Modifications may include the following:

1. Shaving all circling roots on the exterior of the root mass deep enough so that all cut roots' ends are roughly radial to the trunk.

2. Removal of all roots above the top of the main structural roots and trunk flare including any roots that are imprints from previous smaller containers.

2.2 INORGANIC SOIL AMENDMENTS

A. Sulfur: Pelletized, biodegradable, commercially processed and packaged, and containing a minimum of 90 percent sulfur capable of oxidizing over time and providing nutrient sulfur with a minimum of 99 percent passing through No. 6 (3.35-mm) sieve and a maximum of 10 percent passing through No. 40 (0.425-mm) sieve.

1. Acceptable Manufacturers:

a. "Tiger 90 CR", John Deere Landscapes (800) 233-6933

B. Iron Sulfate: a non-staining iron with micronutrients, pelletized, slow release, environmentally safe; 40% Iron, 1% Manganese, 1% Zinc, 1% Magnesium, 6% Sulfur; 2% Humic Acids

1. Acceptable Manufacturers:

a. "Premium Green Iron 40% Fe", Gro-Power®, Inc. (800) 473-1307

C. Ammonium Sulfate (21-0-0): a granular ammonium sulfate with 21% total nitrogen, 24% sulfur and 55% inert ingredients.

1. Acceptable Manufacturers:

a. Best "Ammonium Sulfate 21-0-0", Simplot (800) 992-6066

D. Agricultural Gypsum: Minimum 90 percent calcium sulfate (CaSo4, H2O), a commercially processed and packaged gypsum, finely ground with 90 percent passing through No. 50 (0.30-mm) sieve.

E. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

2.3 COMPOST

A. Humus material shall have an acid-soluble ash content of no less than 5% and no more than 20%.

B. Organic matter shall be between 30% minimum and 60% maximum on a dry weight basis.

C. The pH of the material shall be between 6 and 8

D. Permeability Rate - Hydraulic conductivity rate shall be not less than one inches per hour nor more than three inches per hour

E. Compost shall be provided from a licensed facility and shall be “metered.

F. Compost shall undergo a pathogen reduction process, be a minimum of 15 days, and kept at a temperature between 131 degrees Fahrenheit to 150 degrees Fahrenheit.

G. The salt content shall be less than 10 millimho/cm @ 25° C. in a saturated paste extract.

H. Boron content of the saturated extract shall be less than 1.0 parts per million.

I. Silicon content (acid-insoluble ash) shall be less than 50%.

J. Calcium carbonate shall not be present if to be applied on alkaline soils.

K. Types of acceptable products are composts, manures, mushroom composts, straw, alfalfa, peat mosses etc. low in salts, low in heavy metals, free from weed seeds, free of pathogens and other deleterious materials.

L. Composted wood products are conditionally acceptable, but stable humus must be present. Wood based products are not acceptable which are based on red wood or cedar.

M. Sludge-based materials are not acceptable.

N. Carbon: nitrogen ratio shall be less than 25:1.

O. The compost shall be aerobic without malodorous presence of decomposition products.

P. The maximum particle size shall be 0.5 inch, 80% or more shall pass a No. 4 screen for soil amending. The maximum particle size shall be 0.25 inch for hydroseeding.

Q. Maximum total permissible pollutant concentrations in amendment in parts per million on a dry weight basis:

arsenic	20
copper	150
selenium	50
cadmium	15
lead	200
silver	10
chromium	300
mercury	10
vanadium	400
cobalt	50
molybdenum	20
zinc	250
nickel	100

R. Higher amounts of salinity or boron to be pre-leached to reduce the excess.

S. Acceptable Manufacturers:

1. "Humic Compost", AgriService (760) 439-9920

2. "Forest Floor Humus", Aguiñaga Fertilizer 909/424-1400

3. "Washed Steer Humus", Earthworks 951-782-0260

4. "Economix", Agromin 805/432-5265

2.4 FERTILIZERS

A. Potassium sulfate (0-0-50): a low salt fertilizer for potassium deficient soils that provides high levels of potassium for increased drought, heat, wear, and cold tolerance. Contains 18% Sulfur minimum for improved color and plant density, and 50% soluble potash derived from potassium sulfate.

Soluble Potash	50%	minimum
Sulfur	18%	minimum

1. Acceptable Manufacturers:

   a. "Sulfate of Potash 0-0-50", Best Fertilizer (800) 992-6066.

B. Triple superphosphate (0-45-0): a fertilizer for eliminating phosphorus deficiencies in soils. Contains phosphate derived from monocalcium phosphate and dicalcium phosphate, with a PH (20% solution) of 3.1; 90% water solubility;

and 87% passes through a 4 mm screen with 100% retained by a 1.18 mm screen.

Available Phosphate	45%	minimum
Calcium	13.5%	minimum

1. Acceptable Manufacturers:

   a. "Triple Superphosphate 0-45-0", Best Fertilizer (800) 992-6066.

2. Palm, Tropicals and Bamboo Fertilizer (9-3-9) : Controlled release nitrogen and potash with Micronutrients.

Nitrogen (total)	9%	minimum
Water Soluble Organic Nitrogen	0.92%	
Water Insoluble Organic Nitrogen	8.08%	
Phosphoric Acid	3%	minimum
Potash (total)	9%	minimum
Soluble Potash	1.10%	
Slowly available potash	7.9%	
Calcium	3%	
Magnesium	4%	
Iron	2%	
Manganese	0.05%	
Zinc	0.05%	

3. Acceptable Manufacturers:

   a. "Gro-Power Palm Fertilizer and Tropicals (9-3-9)",Gro-Power®, Inc. (800) 473-1307,

C. Planting Tablets: Tightly compressed chip type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots. Slow release fertilizer tablets, soil conditioner, 24-month formulation with trace elements, composted organic higher plant form life and mineral matter. Shall not contain any poultry, animal or human waste.

1. Nutrient Composition:

Nitrogen (total)	20%	minimum
Ammonical Nitrogen	2%	
Water Soluable Organic Nitrogen	5.3%	
Water Insoluable Organic Nitrogen	12.7%	
Phosphoric Acid	10%	minimum
Soluable Potash	5%	minimum
Calcium	3.5%	
Sulphur	2.5%	minimum
Iron (Fe)	2%	minimum
Manganese	0.05%	minimum
Zinc	0.05%	minimum
Humic Acids (derived from compost)	2.5%	minimum

2. Acceptable Manufacturers:

   a. “Gro-Power (20-10-5) Planting Tablets”, Gro-Power®, Inc. (800) 473-1307

2.5 MYCORRHIZAL SOIL CONDITIONER AND HUMIC ACIDS

A. Mycorrhizal Inoculum / Soil Conditioner: Inculum shall be both Endo and Ecto (granular), with consititing of propagules (spores, fragments of fungal mycelium, and pieces of mycorrhizal roots capable of colonizing host plant roots) of the vesicular arbuscular mycorrhizal species Glomus intraradices, Glomus aggregatum, Glomus mosseae, combined with other species and/or additional genera including, Sclerocyctis, Gigaspora, Scutellospora, Entrophospora, and Acaulospora. Ectomycorrhiza include Pisolithus and 4 species of Rhizopogon. Soil Conditioner portion shall consist of organic materials consisting of higher plant form life, composted beyond the fiberous stage, to humus. Also shall have humic acids and beneficial soil bacteria strains. It shall NOT contain poultry, animal or human waste (i.e., sewage sludge), pathogenic viruses, fly larvae, insecticides, herbicides, fungicide or poisonous chemicals that would inhibit plant growth.

1. Nutrient Composition:

Ingredients	percentage	(minimum)
Mycorrhizal Inoculum	6,500/55,00	progagules per lb.*
Humus	65%	
Humic Acids	25%	

2. Acceptable Manufacturers

   a. “GroLife Granular”, Gro-Power®, Inc (800) 473-1307.

B. Humic Acids (from Leonardite) 50 .00 %

1. Nutrient Composition: Per random sample of material.

Organic matter	40.00%
Carbon	40.00%
Nitrogen	0.05%
Phosphoric Acid	0.07%
Potash	0.13%
Sulfur	0.21%
Magnesium	0.18%
Calcium	0.32%
pH	4.0
Soluble Salts	1.8

2. Acceptable Manufacturers

   a. “Tri-C Premium Humate” (800) 927-3311.

2.6 PLANTING SOILS

A. Import Topsoil: ASTM D 5268 topsoil, with pH range of 5.5 to 7, a minimum of **2** percent organic material content; free of stones 1 inch (25 mm) or larger in any dimension and other extraneous materials harmful to plant growth.

1. Import topsoil to be supplied for the full depth of raised planters indicated below and in Planting Cells of Grasscrete Porous Paving: Submit Amended Imported Topsoil to City's Representative for evaluation. Provide Imported Topsoil from off-site sources, obtained from naturally well-drained site; do not obtain from bogs or marshes; see Part 1 for definition of raised planters.

2. Import topsoil also to be used on-grade as required for fill operations or as specified in the drawings.

3. Permeability Rate - Hydraulic conductivity rate shall be not less than one inches per hour nor more than three inches per hour

4. Silt plus clay content of the import soil shall not exceed 20% by weight with a minimum 95% passing the 2.0 millimeter sieve. The sodium absorption rate (SAR) shall not exceed 6 and the electrical conductivity (ECe) of the saturation extract of this soil shall not exceed 3.0 millimhos per centimeter at 25 degrees centigrade. The boron content shall be no greater than 1 part per million as measured on the saturation extract.

5. Additional Properties of Imported Topsoil or Manufactured Topsoil: Screened and free of stones 1 inch (25 mm) or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass; not infested with nematodes; grubs; or other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled pore space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.

6. General requirement for Lightweight on-structure soil mix:

   a. Chemistry:

1)	Reaction (pH) saturated paste	6.0-7.6
2)	Salinity (ECe dS/m) saturation extract	<3.0
3)	Sodium adsorption ratio (SAR)	<6.0
4)	Boron in saturation extract, ppm	<1.0

b. Texture:

Particle Size	USDA Sieve Size	% Passing
1) Gravel	2.0	>85%
2) Coarse sands	0.5	>75%
3) Silt + clay*	0.05**	<35%

*Silt to clay ratio shall be 0.5 – 1.2
**Use Hydrometer method

7. Submit results of agricultural soils analysis testing for review and approval by the Landscape Architect.

8. Provide Amended Imported Topsoil in sufficient quantities which allow for natural settling and compaction of the topsoil mix in the Raised Planters, and flush with the top of the Grasscrete Porous Paving cells. Prioir to planting plant materials, Raised Planters and Grasscrete cells shall be compacted to 90% density to minimize settling. Set Amended Imported Topsoil and compact accordingly in 6" lift to within 4" of top of the Raised Planters.

   a. Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
      1) A-1 San Diego Select Topsoil, Hanson Aggregates A-1 Soils.
      2) Topsoil Mix #5, Agromin Horticultural Products.
      3) 70/30 Topsoil, Agri-Service

B. Lightweight On-structure Soil Mix:

1. Custom lightweight on-structure soil mix capable of supporting vigorous growth of the specified planting and shall comply with the following specification.

   a. Sources:
      1) "Intensive LiteTop Growing Media" as supplied by American Hydrotech, (714) 377-9599.
      2) Or approved Equal.

2. Lightweight On-structure soil mix to be supplied for the full depth of on structure planting areas; for extent of on structure soil on structure limits with an allowance for additional 25% compaction after installation and compaction.

3. Lightweight On-structure soil mix constituents

   a. Constituent percentages shown by volume.

1) Organic Components:	
a) Well-Aged Compost	20%
2) Mineral Aggregates:	
a) Scoria/ Pumice	50%
b) Course Sand	30%

4. General requirement for Lightweight on-structure soil mix:

a. Grain Size Distribution:
   1) clay fraction: 0-2 %
   2) passing #200 sieve: 5-15 %
   3) passing #60 sieve: 10-25 %
   4) passing #18 sieve: 20-50 %
   5) passing 1/8-inch sieve: 55-95 %
   6) passing 3/8-inch sieve: 90-100 %

b. Density
   1) Application Density: approx.44-68 lbs lbs/cf.
   2) Saturated Density:
      a) Total saturated load of lightweight on-structure soil mix shall not exceed 62-93 lbs/cf.
   3) Dry Density: approx. 38-68 lbs lbs/cf.

c. Water & Air Management (% vol.)
   1) Saturated water capacity: >40 %
   2) Saturated air content: >10 %

d. Saturated Hydraulic Conductivity
   1) >0.5 mm/min(>1.0 in/hr)

e. Chemistry
   1) pH of lightweight on-structure soil mix: 5.5 - 7.5.
   2) Salts content (water extract): <3.0 g/l (2.0 mmhos/cm).
   3) Boron content (saturated extract): <1.0 part per million.
   4) Silicon content (acid-insoluble ash): <20%.
   5) Carbonate content: <25 g/l. Calcium carbonate shall not be present in alkaline lightweight soil mix.
   6) Carbon-nitrogen ratio (C/N ratio): <15:1.
   7) Cation Exchange Capacity: >6 cmol/kg

5. WELL-AGED COMPOST

a. Product shall be finished humus.

b. Respiration rate/CO2 evolution (stability indicator): 2.5 or lower

c. Product shall meet or exceed USEPA Class A standard, 40 CFR 503.13, Tables 1 & 3 (chemical contaminants) and 40 CFR 503.32(a) (pathogens) and/or be permitted in the state of origin to produce Class A material.

d. Product shall meet US Compost Council STA/TMECC criteria or equal for Class I or II stable, mature product.

e. Humus material shall have an acid-soluble ash content of no less than 5% and no more than 20%. Organic matter shall be at least 50% on a dry weight basis.

f. The pH of the material shall be between 6 and 7.5.

g. The salt content shall be less than 10 millimho/cm @ 25° C. in a saturated paste extract.

h. Boron content of the saturated extract shall be less than 1.0 parts per million.

i. Silicon content (acid-insoluble ash) shall be less than 50%.

j. Organic matter shall be at least 50% on a dry weight basis.

k. Calcium carbonate shall not be present if to be applied on alkaline soils.

l. The maximum particle size shall be 0.5 inch, 80% or more shall pass a No. 4 screen.

m. Carbon:nitrogen ratio (C/N ration) is less than 15:1.

n. Types of acceptable products are composts, manures, mushroom composts, straw, alfalfa, sludge, etc., that are low in salts, low in heavy metals, free from weed seeds, free of pathogens and other deleterious materials.

o. Sludge-based materials are not acceptable.

p. Maximum total permissible pollutant concentrations in product in parts per million on a dry-weight basis:

1)	Arsenic:	20
2)	Cadmium:	15
3)	Chromium:	300
4)	Cobalt:	50
5)	Copper:	150
6)	Lead:	200
7)	Mercury:	10
8)	Molybdenum:	20
9)	Nickel:	100
10)	Selenium:	50
11)	Silver:	10
12)	Vanadium:	400
13)	Zinc:	250

q. Composts made from peat mosses are not acceptable due to depleting stocks of this non-renewable resource and harm caused to peat bog ecosystems by mining the material.

r. Composted wood products are conditionally acceptable, stable humus must be present. Wood-based products are not acceptable which are based on redwood or cedar.

s. Compost shall be aerobic without malodorous presence of decomposition products.

t. Source: “Wonder Grow Humus”, American Soil Amendment Products, Simi Valley, CA 93065, (805) 578-0999, or equivalent.

6. COURSE SAND

a. Sand Particle Size Distribution Range Requirements (growing medium Component: Size Definition (mm); ~Allowable Range):
   1) Coarse Gravel: >4.0; 0%
   2) Fine Gravel: 2.0 to 4.0; 3 to 5%
   3) Sand: 0.05 to 2.0; 88 to 93%
   4) Fine Sand: 0.05 to 0.15; <35%
   5) Silt: 0.002 to 0.05; <8%
   6) Clay: <0.002; <5%
   7) Organic Matter: <2.0; <3%

b. Methods of Analysis: ASTM F1632

7. Scora/ Pumice

a. Light weight rock specified as follows:
   1) 100% passing: 3/8
   2) 63% passing: #4
   3) 26% passing: #8
   4) 23% passing: #16
   5) 21% passing: #30
   6) 19% passing: #50
   7) 13% passing: #100
   8) 6% passing: #200
   9) Source: American Soil Amendment Products, Simi Valley, CA 93065, (805) 578-0999, or equivalent.

8. AMENDMENTS REQUIREMENT

a. Gypsum:
   1) Apply at a rate of 0.5-1.0 lbs/cu. yd. of soil mix, as determined by soils laboratory written amendment recommendations.
   2) Product shall contain 80% minimum calcium sulfate.
   3) Product shall be made with maximum possible content of recycled drywall.

b. Pre-Plant Fertilizer:
   1) Type: Balanced, twice-a-season application, controlled-release pelleted organic fertilizers with a blend of molasses, feathermeal, bone meal & mined potassium sulfate which supply controlled-release nitrogen, phosphorus and potassium.
   2) Specification: Fertilizer amendment shall be specified by soils lab written amendment recommendations to meet the following plant available nutrient requirements:
      a) Nitrogen (NO3): 3 - 15 lb/1,000 ft3
      b) Phosphorus: 1 - 7 lb/1,000 ft3.

c) Potassium: 6 - 15 lb/1,000 ft3.
d) Calcium: 19 - 65 lb/1,000 ft3.
e) Magnesium: 3 - 15 lb/1,000 ft3.

3) Plant Plus (7-5-7) F324, or equivalent.
4) Supplier: Peaceful Valley Farm & Garden Supply, 125 Clydesdale Court, Grass Valley, CA 95945 (530) 272-4769

C. Bioswale Growing Medium: Suitable Import, Borrow Topsoil or Reclaimed soil

1. General - Topsoil shall be free of roots, clods, stones larger than 1-inch in the greatest dimension, pockets of coarse sand, noxious weeds, sticks, lumber, brush and other litter. It shall not be infested with nematodes or other undesirable disease-causing organisms such as insects and plant pathogens.

2. Topsoil shall be friable and have sufficient structure in order to give good tilth and aeration to the soil.

3. Gradation limits - soil shall be a sandy loam or loam. The definition of soil texture shall be the USDA classification scheme. Gravel over ¼-inch in diameter shall be less than 10% by weight.

4. Permeability Rate - Hydraulic conductivity rate shall be not less than five inches per hour nor more than 10 inches per hour when tested in accordance with the USDA Handbook Number 60, method 34b or other approved methods.

5. Fertility - The range of the essential elemental concentration in soil shall be as follows:

Ammonium Bicarbonate/DTPA Extraction parts per million (mg/kilogram	dry weight basis
phosphorus	2 - 40
potassium	40 - 220
iron	2 - 35
manganese	0.3 - 6
zinc	0.6 - 8
copper	0.1 - 5
boron	0.2 - 1
magnesium	50 - 150
sodium	0 - 100
sulfur	25 - 500
molybdenum	0.1 - 2

6. Soil may need to be amended and conditioned to optimize plant growth. The above listed fertility is for soil selection.

7. Concentration of nutrients for final acceptance.

Ammonium Bicarbonate/DTPA Extraction parts per million (mg/kilogram	dry weight basis

phosphorus	10 - 40
potassium	100 - 220
iron	24- 35
manganese	0.6 - 6
zinc	1 - 8
copper	0.3 - 5
boron	0.2 - 1
magnesium	50 - 150
sodium	0 - 100
sulfur	25 - 500
molybdenum	0.1 - 2

Acidity - The soil pH range measured in the saturation extract (Method 21a, USDA Handbook Number 60) shall be 6.0 - 7.9.

Salinity - The salinity range measured in the saturation extract (Method 3a, USDA Handbook Number 60) shall be 0.5 - 2.5 dS/m.

Chloride - The maximum concentration of soluble chloride in the saturation extract (Method 3a, USDA Handbook Number 60) shall be 150 mg/l (parts per million).

Boron - The maximum concentration of soluble boron in the saturation extract (Method 3a, USDA Handbook Number 60) shall be 1 mg/l (parts per million).

Sodium Adsorption Ratio (SAR) - The maximum SAR shall be 3 measured per Method 20b, USDA Handbook Number 60.

Aluminum – Available aluminum measured with the Ammonium Bicarbonate/DTPA Extraction shall be less than 3 parts per million.

Soil Organic Matter Content - Sufficient soil organic matter shall be present to impart good physical soil properties but not be excessive to cause toxicity or cause excessive reduction in the volume of soil due to decomposition of organic matter. The desirable range is 3% to 5%. The carbon:nitrogen ratio should be about 10. A high carbon:nitrogen ratio can indicate the presence of hydrocarbons or non-humified organic matter.

Calcium Carbonate Content - Free calcium carbonate (limestone) shall not be present for acid-loving plants.

Heavy Metals - The maximum permissible elemental concentration in the soil shall not exceed the following concentrations:

Ammonium Bicarbonate/DTPA Extraction parts per million (mg/kilogram) dry weight basis	
arsenic	1
cadmium	1
chromium	10
cobalt	2

lead	30
mercury	1
nickel	5
selenium	3
silver	0.5
vanadium	3

8. If the soil pH is between 6 and 7, the maximum permissible elemental concentration shall be reduced 50%. If the soil pH is less than 6.0, the maximum permissible elemental concentration shall be reduced 75%. No more than three metals shall be present at 50% or more of the above values.

9. Phytotoxic constituent, herbicides, hydrocarbons etc. - Germination and growth of monocots and dicots shall not be restricted more than 10% compared to the reference soil. Total petroleum hydrocarbons shall not exceed 50 mg/kg dry soil measured per the modified EPA Method No. 8015. Total aromatic volatile organic hydrocarbons (benzene, toluene, xylene and ethylbenzene) shall not exceed 0.5 mg/kg dry soil measured per EPA Methods No. 8020.

10. Submit results of agricultural soils analysis for review and approval by the City's representative.

    a. Acceptable Manufacturers:
        1) "Bioswale Mix", Agri-Service
        2) "Bioswale Mix", Hanson A-1 Soils

2.7 MULCHES

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

1. Type: " Gorilla Hair" Redwood Bark Mulch, fibrous, stringy, dark red product that is 100% derived from Sempervirens species of the Sequoia Redwood tree.

    a. Size Range: Particle size shall be 95% passing a range from 1" to 3", with some fibers being longer than 3"

    b. Acceptable Manufacturer:
        1) John Deere Landscapes (800) 233-6933, or equal.

2. Type: Agri Service "Forest Mulch" or "Forest Fines": organic forest products with leaf litter, light in color, free of trash and other deleterious materials and animal waste, with pathogens and weeds removed by temperature treatment.

    a. Size Range:
        1) 1"-5" (Forest Mulch)

2) ½" – 2" (Forest Fines)

b. Acceptable Manufacturer:
1) Agri Service Inc. (800) 262-4167

3. Type: Agri Service "Perennial Mulch" or "Orchard Mulch": composted mulch product, dark in color, high in organic content and comprised of yard trimming, free of trash and other deleterious materials and animal waste, with pathogens and weeds removed by temperature treatment.

a. Size Range:
1) 3/4" Screened (Perennial Mulch)
2) 2" minus (Orchard Mulch)

b. Acceptable Manufacturer:
1) Agri Service Inc. (800) 262-4167

4. Type: Agri Service "Landscape Mulch" or "Trail Mulch": comprised of tree wood and clean construction lumber waste products, light in color, free of painted or stained wood, trash and other deleterious materials and animal waste.

a. Size Range:
1) 1"-3" (Landscape Mulch)
2) 1"-2" (Trail Mulch)

b. Acceptable Manufacturer:
1) Agri Service Inc. (800) 262-4167

5. Type: Trade Mark "Pacific Mulch: Appearance grade, composed organic forest products, free of trash and other deleterious materials, with pathogens and weeds removed by temperature treatment

a. Size Range: 1"-3"

b. Acceptable Manufacturer:
1) John Deere Landscapes (800) 233-6933

6. Type: Fir and Pine Bark; free of trash and other deleterious materials.

a. Size Range: 1/4"-3/8"

b. Product name "Bark Bits"

c. Acceptable Manufacturer:
1) John Deere Landscapes (800) 233-6933

2.8 FILTER FABRIC

A. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, 4.5 oz./sq. yd. minimum, with a tensile strength of 120 lbs, water flow reate of 135 g/mi/s.f. and UV Resistance of 70% composed of fibers formed into a stable network so that fibers retain their relative position. Fabric shall be inert to biological degradation and resist naturally-encountered chemicals, alkalis, and acids.

a. Product: “Mirafi 140 N” by Tencate, or approved equal

2.9 PESTICIDES

A. Prior to using pesticides, contractor shall review procedures with the Landscape Architect and obtain written approval prior to using any pesticides.

B. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

C. Contractor shall be licensed by the County to perform pesticide applications.

D. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

1. Acceptable Manufacturers:

a. Treflan
b. Surfland
c. Eptan

E. Post-Emergent Herbicide: Round-up

2.10 TREE STABILIZATION MATERIALS

A. Stakes and Guys:

1. Wood Stakes: Shaved, sound, new lodgepole pine, free of knots, branches, holes, cross grain, and other defects, of the length indicated on the Drawings, pointed at one end.

a. Stakes for 24” box trees or smaller shall be no less than 10 feet in length and 2” in diameter.

b. Stakes for 36” box trees and larger shall be no less than 12 feet in length and 3” in diameter.

c. Acceptable Manufacturers:

1) Villa Root Barrier, Inc. (800) 654-4067

2. Tree Ties: Flexible non-deteriorating self fastening, black vinyl ties of sizes required to adequately support trees.

   a. Acceptable Manufacturers:
      1) Gro-Straight ties
      2) Cinch-Ties

3. Guying Materials: 3/16" braided steel cable, 6" open turnbuckles, ½" pvc pipe, Duckbill Anchors or 2 x 4 x 24" redwood deadman or approved equal.

4. Flags: Standard surveyor's plastic flagging tape, white, 6 inches (150 mm) long.

2.11 LANDSCAPE EDGINGS

A. Corten Steel (A588) Edging: Standard commercial-steel edging, rolled edge, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.

   1. Basis-of-Design Product: Subject to compliance with requirements:

   2. Size: 1/4" thick by 6" high

   3. Acceptable supplier; Baker Iron Works (858) 755-2255

2.12 AERATION TUBES

A. Tubes: 4" dia. Schedule 40 PVC perforated pipe cut to lengths as shown on the Drawings.

   1. Acceptable Manufacturer: Pacific Plastics, Inc. (714)-990-9050.

B. Grates: 4"dia.

   1. For Bark Chip Planting areas: round, black, plastic atrium drain grates;

   2. For Gravel and stone mulch planting areas: round, brown, flat plastic drain grates.

   3. Acceptable Manufacturer: National Diversified Sales (NDS).

C. Filter fabric "sock": Spunbond, Typar 3341, Geoscape Landscape Fabric - 2.5 oz., Commercial Grade"

   1. Acceptable Manufacturer: ADS (800) 821-6710.

2.13 ROOT BARRIER <pick one>

A. Root barrier shall be “Typar Biobarrier” root control root fabric with Treflan, 39” width unless otherwise noted in the plans.

1. Acceptable Manufacturer: Dow Elanco., John Deere Landscapes (800) 233-6933.

B. EROSION CONTROL MATERIALS

C. Erosion Control Jute Mesh (for slopes of 3:1 or less): Jute mesh shall be new and shall be of a uniform, open, plain-weave mesh. The mesh shall be made from unbleached single jute yarn and shall be 100% biodegradable. The yarn shall be of loosely twisted construction and shall not vary in thickness by more than half its normal diameter. Jute mesh shall be furnished in rolled strips and shall conform to the following provisions.

1. Width - 1200 mm {48 inches}, with a tolerance of ± 25 mm {± one inch}

2. Thickness – 187 mils

3. Mass - 11.94 oz per square yard

4. Water Absorption rate - 42.5%

5. Light Penetration – 45%

6. Ground Cover – 55%

7. Tensile strength – 76.5 lbs/in minimum

8. Include manufacturer’s recommended steel wire staples, U- shaped, 8 gauge, 8 inches long.

9. Acceptable Manufacturer - Anti-Wash Geojute, Belton Ind. Dist. By John Deere Landscapes (800) 233-6933.

D. Erosion Coconut Matting (for slopes greater than 3:1): Erosion control matting shall be new and shall be of an evenly distributed layer of 100% coconut fiber stitched with biodegradable thread to a structure composed of Leno woven 100% biodegradable jute fiber top net and a woven 100% biodegradable jute fiber bottom net.

1. Acceptable Product and Manufacturer – “BioNet C125BN” by North American Green, Dist. By Triumph Geo-Synthetics, Inc. (800) 772-2040 or approved equal

E. Provide erosion control at slopes 3:1 or greater or as otherwise indicated in the Drawings.

2.14 MISCELLANEOUS PRODUCTS

A. Wood Pressure-Preservative Treatment: AWPA C2, with waterborne preservative for soil and freshwater use, acceptable to authorities having jurisdiction, and containing no arsenic; including ammoniacal copper arsenate, ammoniacal copper zinc arsenate, and chromated copper arsenate.

B. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

1. Acceptable Manufacturer: Wilt Pruf

C. Burlap: Non-synthetic, biodegradable.

D. Planter Drainage Gravel: Washed, sound crushed stone or gravel complying with ASTM D 448 for Size No. 8.

E. Tree Protection Material: Enclosure: 5’ tall chain link fence with a minimum 1½” dia. posts and 1” top and bottom rails. Caution tape, or twine and flags are not acceptable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. No work under this section shall commence until all submittals have been reviewed and approved. Do not proceed with installation until all unsatisfactory conditions have been corrected.

B. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.

3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Landscape Architect and replace with new planting soil.

3.2 SOILS TESTS

A. At the conclusion of rough grading, collect soil samples in the locations indicated on the plans and as described in Part 1 Quality Assurance. Each soil test location identified on the plans shall be collected using a soil probe. Each soil test location shall be comprised of 12 separate soil test probings collected from the area immediately adjacent to the soil test location identified on the plans. Under no circumstance shall the soil sample be dug by shovel and bagged from a single location. Submit the samples to an approved agricultural soils laboratory for testing.

B. Submit the test results and laboratory recommendations to the Landscape Architect for review. No amendments shall be applied prior to receipt of test results. Test recommendations shall include the amendments listed in this specification.

C. The Landscape Architect shall recommend changes to the amendments and/or procedure listed herein, after review of the test results.

D. Costs for testing and retesting the soil shall be included in the base bid.

E. Costs for soil leaching shall be included in the base bid, but only performed if specifically identified in the soil test results.

F. Soil testing is considered a long lead item, retesting may be required to confirm that recommended remediation measures were successful and soil test results are within the acceptable ranges for plant growth. The time frame for this work shall not be shortened because adequate time was not allowed for testing and retesting of the soils. The soils will need to be retested until an acceptable test result is attained.

G. Cost change for soil preparation work shall be in accordance with the provisions of the General Conditions. Refer to Part 1 Quality Assurance for additional requirements.

3.3 SOIL LEACHING

A. Soil leaching shall be included in the base bid but provided only if specifically recommended in the soil test reports. The soil leaching shall be performed as noted in the soil test report. If no recommendations are provided in the report, soils shall be leached for a minimum of one (1) week, but no longer than two (2) weeks, using the methods outlined below.

1. Add compost and any non-leachable amendments to the soil and till to a depth of 6”

2. Irrigate soil to the point of saturation when water begins to collect on the surface, but before erosion of the planting soil begins

3. Allow soil to dry for a minimum of 24 hours

4. Continue to re-irrigate the soil to the point of saturation and dry for a minimum of 24 hours for a minimum of five (5) working days.

5. Recollect soil samples for retesting using the methods mentioned above; resubmit test results to landscape architect for review.

6. If soils reports show the soil has adequately been leached, add leachable amendments and fertilizers as identified in the soils report and till to a depth of 6”.

7. If soil test results show the leaching has not adequately lowered the soils to required levels, continue to leach for an additional week prior to incorporating leachable soil amendments and fertilizers as identified in the soils report and till to a depth of 6”.

3.4 WEED CONTROL

A. Prior to commencement of the planting operations, remove all weeds including the roots, remove existing plant material including stumps designated not to remain, dispose of cleared and grubbed material at a legal refuse site.

B. Prior to using herbicides, review procedures with the City, and obtain written approval. Herbicide applications requiring government or agency approvals shall be performed by an operator licensed by the County. Protect existing plant material on site and on adjacent properties from exposure to herbicides and equipment.

3.5 PREPARATION AND LAYOUT

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Landscape Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.

3.6 PROTECTION OF EXISTING PLANT MATERIAL

A. Erect the tree protection enclosures prior to commencing with site demolition work. Maintain fence during the entire construction period and remove when no longer needed, obtain approval from the Landscape Architect prior to removal.

B. Install the enclosure a minimum of 3’ outside of the drip line of the tree or palm. Increase enclosure size for groupings of trees or in conditions where heavy equipment work may damage overhead branches. Set the posts a maximum of 10’ on center, and stake to the ground. Perform work inside the enclosures by hand, where conditions permit alternative methods, obtain approvals from the Landscape Architect for such work.

C. During the entire construction phase, provide ongoing maintenance of the existing plant materials, including watering, fertilizing, pest and disease control, and adjustments to the enclosures as directed by the Landscape Architect.

D. Trees damaged by construction shall be inspected by a certified arborist. Repair damaged trees as directed by the arborist. Replace trees damaged beyond repair as determined by the arborist, with the same species and of similar size or value. Repair, replacement, and inspections by the arborist, shall be at not additional expense to the City.

3.7 EROSION CONTROL

A. Install jute mesh on slopes over 3:1. After any grading, clearing and grubbing that is required, fine-grade the sloped planting areas to receive jute mesh, removing all surface rocks and debris greater than 2” in diameter.

B. Jute mesh shall be installed loosely on the slopes. Longitudinal seams of the jute mesh shall be at right angles to the slope contour lines. The installed mesh shall fit the soil surface contour and shall be held in place by 230 mm {9-inch} long, 3.05 mm (11-gage) (minimum) steel wire staples driven vertically into the soil at approximately 600-mm {24-inch} spacing. Jute mesh strips shall overlap the adjacent jute mesh a minimum of 150 mm {6 inches}. Ends of strips shall be buried into the soil a minimum of 150 mm {6 inches}.

3.8 SOIL PREPARATION

A. Use the soil preparation instructions listed below for bidding purposes only. Actual preparation of soil may be modified by the Native Planting contractor with written permission from the Landscape Architect.

B. Proceed with this part of the work only after soil test analysis recommendations have been approved by the Landscape Architect.

C. Rip or loosen native soil or subgrade in all planting areas to a minimum depth of **18** inches without adding soil conditioner.

D. Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off City's property.

E. Prepare areas within the driplines of existing trees by hand, do not use mechanical tillers.

F. Float smooth and compact all soil preparation areas to 85% relative dry density, maintain positive drainage, flow lines, and swells to area drains, fine grade to within plus or minus 0.10 foot of the grades shown on the Drawings.

G. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

H. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

I. Application of Native Plant Mycorrhizal Fungi Soil Conditioner: Broadcast dry product uniformly over prepared soil at 20 lbs/ 1,000 SF application rate or as recommended by the manufacturer.

3.9 PRE PLANT WEED CONTROL

A. Clear and remove existing weeds at least one-inch (1”) below the soil surface.

B. Fertilize areas to receive planting with a 46-0-0 NPK commercial fertilizer at the rate of ½ lb. per 1,000 square feet.

C. After fertilization, irrigate the soil thoroughly and continuously at the equivalent of four inches (4”) of water distributed over a fourteen (14) – day period. The application of water shall be applied to the soil as needed to gradually soak through the soil profile and not allowed to run-off the surface. Employ a specific watering duration and frequency program designed to germinate all residual weeds.

D. After sufficient weed germination is present, apply non-selective, post-emergent contact herbicide, in strict accordance to the Manufacturer's directions. Protect and buffer surrounding properties, buildings, and vegetation from overspray, as required.

E. Allow for a sufficient time period to ensure that the weeds are dead and the herbicide has dissipated, per the Manufacturer's recommendation.

F. Water planting areas thoroughly and continuously for a period of one (1) week after the application of the herbicide. Discontinue the watering process for one (1) day prior to the second application of the herbicide. Apply a second application of the herbicide. Avoid any irrigation for a minimum of four (4) days after the second application for effective weed kill.

G. After the second application and waiting period, water planting areas thoroughly and continuously for three (3) consecutive days to saturate upper layers of the soil prior to commencing planting operations.

H. Dead weeds shall be cleared and removed prior to planting.

I. Maintain a weed-free Project Site until final acceptance by the Diocese, utilizing mechanical, chemical or manual treatment.

3.10 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

1. Excavate approximately two times as wide as ball diameter for container-grown stock.

2. Do not excavate deeper than depth of the root ball less one inch, measured from the root flare to the bottom of the root ball.

3. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.

4. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.

5. Maintain supervision of excavations during working hours.

6. Keep excavations covered or otherwise protected when unattended by Installer's personnel.

7. If subdrainage is shown on Drawings or required under planting areas, coordinate planting operations with installation of subdraiange.

B. Obstructions: Notify Landscape Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

C. Drainage: Notify Landscape Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

D. Subsoil and topsoil removed from excavations may be amended and used as planting backfill mix.

3.11 PERCOLATION TESTING

A. Locate and prepare the percolation test pits where indicated on the Drawings, and as described herein.

B. Excavate the pits as described under the Excavation for Trees and Shrubs section, remove all loose material, and fill the pits with six inches (6") of water. After 12 hours refill with the same amount of water. Six hours after the second filling, inspect the pits with the Landscape Architect and document locations where water remains in the pit.

C. If percolation problems occur, drill 8-inch- (150-mm-) diameter holes, 24 inches (600 mm) apart, into free-draining strata or to a depth of 5 feet below the bottom of rootball whichever is less, and backfill with drainage gravel and 4”diameter perforated PVC pipe open to below. Cap with appropriate grate, see AERATION TUBES Part 2.

3.12 TREE, SHRUB, GROUNDCOVER AND VINE PLANTING

A. To leach saline and sodic salts from the soil, fill all excavations with water and allow to percolate away before positioning trees and shrubs.

B. Notify the Landscape Architect of conditions where hardpan, adobe clay, or inadequate subgrade compaction are encountered. Planting operations at the locations identified shall be suspended pending corrective action.

C. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

D. Shave and/or shovel cut the outer 1/8” to 1/4” of the rootball for shrubs up to 15 gallons and 1/2” to 1” for 24” box and larger plants to ensure that all circling roots on the exterior of the root ball’s ends are roughly radial to the trunk to promote outward root growth. Remove any injured roots by cutting cleanly; do not break.

E. Use the soil amendments listed below for bidding purposes only. Materials and application rates may be modified after receipt of soils tests noted Part 3 Soils Tests.

1. Backfill mixture for all plants shall be thoroughly blended, consisting of the following:

Soil Amendment	1	part
Existing Soil	3	parts
Potassium sulfate	1	lb/cy of mix
Triple superphosphate	1	lb/cy of mix
Agricultural Gypsum	3	lb/cy of mix
Mycorrhizal Inoculum Soil Conditioner	5	lb/cy of mix
Humic Acid	5	lb/cy of mix

F. Place planting tablets in the planting pits at the following rates:

Plant Size	Quantity	Tablet	Size
liner and flat size plant	1	5	gram
1 gallon container	1	21	gram
5 gallon container	2	21	gram
15 gallon container	3	21	gram
Box specimen	2	21	gram for each 12” of box size

G. Set container stock plumb and in center of planting pit or trench with root flare 1 inch (25 mm) above adjacent finish grades or as indicated in the Drawings.

1. Use planting soil listed above for backfill.

2. Do not use planting stock if root ball is cracked or broken before or during planting operations.

3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts listed in the specifications. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole and do not place plant tablets in direct contact with the rootball.

5. Continue backfilling process. Water again after placing and tamping final layer of soil.

6. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.13 AERATION TUBES

A. Wrap tubes with the fabric and set plumb in opposite corners of the planting pit. Place gravel and backfill mix as shown on the Drawings. Tubes to remain open to below. Knot filter fabric sock to prohibit sediment from getting into tubes. Cut tubes to 2” above finish grade and cap with a drain grate.

3.14 TREE AND SHRUB PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Do not apply pruning paint to wounds.

3.15 TREE STABILIZATION

A. Upright Staking and Guying: Per the Drawings.

1. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree. Trees with small caliper trunks may require two (2) sets of tree ties, one set 6" below lowest tree branch and at 12" above finish grade, in order to adequately support the tree.

3.16 ROOT-BARRIER INSTALLATION

A. Install root barrier where trees are planted within 60 inches (1500 mm) of paving or other hardscape elements, such as walls, curbs, and walkways unless otherwise shown on Drawings.

B. Align root barrier vertically and run it linearly along and adjacent to the paving or other hardscape elements to be protected from invasive roots.

C. Install root barrier continuously for a distance of 60 inches (1500 mm) in each direction from the tree trunk, for a total distance of 10 feet (3 m) per tree. If trees are spaced closer, use a single continuous piece of root barrier.

1. Position top of root barrier at finished grade of soil unless otherwise directed. Adhere root barrier product in place using fabric pins or other measures. Secure fabric every two feet for entire length of installation. Adhere to edging or hardscape.

2. Overlap root barrier a minimum of 12 inches (300 mm) at joints.

3. Do not distort or bend root barrier during construction activities.

4. Do not install root barrier surrounding the root ball of tree.

3.17 PLANTING AREA MULCHING

A. The entire limit of all planting areas shall receive landscape mulch unless otherwise specifically stated. Note that the drawings do not show mulch hatch patterns underneath plant symbols for graphic purposes only. The intention is that the entire planted area including the areas underneath the planting symbols shall receive the same landscape mulching.

B. Bark Mulch: At the completion of the planting work, rake smooth the areas indicated on the Drawings, and spread a 3" layer of mulch over the areas. Within 3' of flatwork, headers, curb, and mow edges, taper or reduce the depth to 2". Keep mulch 2 feet away from tree trunks and 4-6" away from shrub stems.

3.18 EDGING INSTALLATION

A. Steel Edging: Install steel edging where indicated according to manufacturer's written instructions. Anchor with steel stakes spaced approximately 18 inches (203 mm) apart, driven below top elevation of edging.

3.19 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.

B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated past management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.20 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with City's operations and others in proximity to the Work. Notify City before each application is performed.

B. Written permission is required.

C. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written recommendations. Do not apply to seeded areas.

3.21 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

C. After installation and before Substantial Completion remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.22 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off City's property.

END OF SECTION

SECTION 33 47 13

POND AND RESERVOIR LINERS

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes geomembrane liners and floating covers for ponds and reservoirs.

B. See Division 31 Section "Earth Moving" for soil materials and geotextiles.

1.02 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details for geomembrane liners. Show panel layout, seams, penetrations, perimeter anchorage, floating cover, and methods of attachment and sealing to other construction. Differentiate between factory and field seams and joints.

C. Samples: For each geomembrane.

D. Product test reports.

E. Maintenance data.

1.03 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Preinstallation Conference: Conduct conference at Project site.

1.04 WARRANTY

A. Special Warranty: Specified form in which geomembrane manufacturer, geomembrane liner and floating cover manufacturer, and geomembrane liner and floating cover Installer agree to repair or replace geomembrane liner and floating cover that fail(s) in materials or workmanship or that deteriorate(s) under conditions of normal weather within specified warranty period. Warranty does not include deterioration or failure of geomembrane liner and floating cover due to exposure to harmful chemicals, gases or vapors, abnormal and severe weather phenomena, fire, earthquakes, floods, vandalism, or abuse by persons, animals, or equipment.
   1. Warranty Period: 20 year(s) from date of Substantial Completion.

PART 2 PRODUCTS

2.01 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, manufacturers listed in other Part 2 articles.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers listed in other Part 2 articles.

2.02 SHEET MATERIALS

A. General: Provide impervious geomembrane liner and floating cover fabricated from sheet material indicated and complying with specified product characteristics.

B. CSPE Sheet: Formulated from CSPE for use in hydraulic structures and formed into uniform, flexible sheets.
   1. Manufacturers:

a. Burke Environmental Products; Div. of Burke Industries.
b. Melco Linings.
c. Stevens Urethane; Div. of JPS Elastomerics; Environmental Products Division.
d. Watersaver Company, Inc.

2. Reinforcing Scrim: One-ply polyester fabric totally encapsulated between two sheets.
   a. Construction: 6 x 6 - 1000 d.
3. Nominal Thickness: 45-mil- (1.14-mm-) thick sheet per ASTM D 751.
4. Minimum Thickness over Scrim: 11-mil- (0.28-mm-) thick sheet per optical method.
5. Hydrostatic Resistance: Not less than 250-psi (1725-kPa) resistance per ASTM D 751, Procedure A.
6. Dimensional Stability, Reinforced Sheet: Not more than plus or minus 2 percent per ASTM D 1204.
7. Breaking Strength: Not less than 200 lbf (0.89 kN) per ASTM D 751, Procedure A.
8. Tearing Resistance: Not less than 70 lbf (0.31 kN), initial, and 25 lbf (0.11 kN), aged, per ASTM D 751, Procedure B.
9. Low-Temperature Flexibility: Pass, 1/8-inch (3-mm) mandrel, 4 hours at minus 40 deg F (minus 40 deg C), and per ASTM D 2136.
10. Ply Adhesion: Not less than 7 lbf/in. (1.2 kN/m) of seam width, or film tearing bond, according to ASTM D 413, Machine Method.
11. Volatile Loss: Not more than 0.5 percent per ASTM D 1203, Method A, 30-mil- (0.76-mm-) thick sheet.
12. UV-Light Resistance: Pass, 4000 hours at 176 deg F (80 deg C), per ASTM G 155.
13. Water Absorption: Not more than 2 percent at 70 deg F (21 deg C) and not more than 30 percent at 158 deg F (70 deg C) for 30 days each per ASTM D 471, 30-mil- (0.76-mm-) thick sheet.

C. PE Sheet: Formulated from virgin PE, compounded for use in hydraulic structures, and formed into uniform sheets.
   1. Manufacturers:
      a. Agru America, Inc.
      b. GSE Lining Technology, Inc.; Div. of Gundle/SLT Environmental Systems, Inc.
      c. Integra Plastics Inc.
      d. Melco Linings.
      e. Plastic Fusion Fabricators, Inc.
      f. Poly-Flex, Inc.
      g. Raven Industries, Inc.
      h. Reef Industries, Inc.
   2. Nominal Density: High density, 0.940 to 0.959 g/cu. cm, per ASTM D 1505.
   3. Nominal Thickness: 40 mil (minimum)
   4. Melt Flow Index: Not more than 0.035 oz./10 minutes (1.0 g/10 minutes) per ASTM D 1238, Condition 190/2.16.
   5. Carbon Black Content: 2 to 3 percent per ASTM D 1603.
   6. Carbon Black Dispersion: Per ASTM D 5596, Note 1.
   7. Tensile Properties: Not less than indicated for each direction, per ASTM D 638.
      a. Strength at Yield: 126 lbf/in. (22 kN/m) and 2100 psi (14.5 MPa).
      b. Strength at Break: 228 lbf/in. (40 kN/m) and 3800 psi (26.2 MPa).
      c. Elongation at Yield: 12 percent.
      d. Elongation at Break: 560 percent.
   8. Dimensional Stability, Reinforced Sheet: Not more than plus or minus 2 percent per ASTM D 1204.
   9. Tearing Resistance: Not less than 39 lbf (0.18 kN) per ASTM D 1004.
   10. Puncture Resistance: Not less than 72 lbf (0.33 kN) per FTMS 101C, Method 2065.1.
   11. Low-Temperature Brittleness: Four hours at minus 76 deg F (minus 60 deg C) per ASTM D 746.

12. Environmental Stress Cracking Resistance: Not less than 1500 hours per ASTM D 1693, Condition B.

2.03 PVC SHEET

A. PVC: Formulated from virgin PVC with plasticizers and other modifiers, compounded for use in hydraulic structures, and formed into uniform, flexible sheets with material properties complying with PGI's "Specification for PVC Geomembranes" for nominal thickness indicated.
   1. Manufacturers:
      a. Cooley Group.
      b. Environmental Protection, Inc.
      c. Integra Plastics Inc.
      d. Lange Containment Systems, Inc.
      e. Melco Linings.
      f. Watersaver Company, Inc.
   2. Nominal Thickness: 40 mil (minimum)
   3. Sheet Texture: One side smooth; other side smooth.

2.04 MISCELLANEOUS MATERIALS

A. Adhesives: Provide types of adhesive primers, compounds, solvents, and tapes recommended in writing by geomembrane liner manufacturer for bonding to structures (if required), for sealing of seams in geomembrane liner, and for sealing penetrations through geomembrane liner.

B. Penetration Assemblies: Provide manufacturer's standard factory-fabricated assemblies for sealing penetrations. Include joint sealant recommended in writing by geomembrane liner manufacturer and compatible with geomembrane liner, containment conditions, and materials.

C. Battens: Long-length strips of material indicated, size as shown on Drawings. Fabricate battens with sharp projections removed and edges eased and predrilled or punched for anchors. Provide anchors, or other type of attachment, of type and spacing recommended in writing by geomembrane liner manufacturer for attaching geomembrane liner system to substrate and as indicated.

2.05 FABRICATION

A. Fabricate geomembrane liner and floating cover panels from sheets in sizes as large as possible with factory-sealed seams, consistent with limitations of weight and installation procedures. Minimize field seaming.

B. Fabricate flotation blocks, wrap in geomembrane, and attach to underside of floating cover according to manufacturer's written instructions.

C. Fabricate ballast tubes of sand-filled geomembrane and attach to top surface of floating cover according to manufacturer's written instructions.

D. Install built-in accessories, hatches, access panels, vents, and walkways on geomembrane floating cover.

2.06 SOURCE QUALITY CONTROL

A. General: Test for bonded seam strength and peel adhesion every 3000 feet (915 m) or once per panel, whichever is more frequent.

PART 3 EXECUTION

3.01 INSTALLATION

A. Examine substrates, with Installer present, for compliance with requirements for soil compaction and grading; for subgrade free from angular rocks, rubble, roots, vegetation, debris, voids, protrusions, and ground water; and for other conditions affecting performance of geomembrane liner.

B. Preparation:
   1. Provide temporary ballast, until edges are permanently secured, that does not damage geomembrane liner or substrate, to prevent uplift of geomembrane liner in areas with prevailing winds.
   2. Prepare surfaces of construction penetrating through geomembrane liner according to geomembrane liner manufacturer's written instructions.

C. Place geomembrane liner over prepared surfaces to ensure minimum handling. Install according to Shop Drawings and to comply with geomembrane liner manufacturer's written instructions. In areas with prevailing winds, begin placing geomembrane liner at Project's upwind direction and proceed downwind. Install geomembrane liner in a relaxed condition, free from stress and with minimum wrinkles, and in full contact with subgrade. Do not bridge over voids or low areas in the subgrade. Fit closely and seal around inlets, outlets, and other projections through geomembrane liner. Permanently secure edges.

D. Field Seams: Comply with geomembrane liner and floating cover manufacturer's written instructions. Form seams by lapping edges of panels 2 to 4 inches (50 to 102 mm), unless instructions require a larger overlap. Wipe contact surfaces clean and free of dirt, dust, moisture, and other foreign materials. Use solvent-cleaning methods and grind geomembrane seam surfaces if recommended by geomembrane liner manufacturer. Proceed with seaming at required temperatures for materials and ambient conditions. Continuously bond sheet to sheet to construct single or double seams of width recommended for method of seaming used. Seal or fuse free seam edges as instructed. Inspect seams and reseal voids.

E. Installation in Anchor Trench: Install geomembrane liner and floating cover in trench according to manufacturer's written instructions, backfill, and compact to lock liner into trench.

F. Attachment to Concrete: Use manufacturer's standard system to suit Project conditions. Support adhesive and geomembrane on not less than 8-inch- (200-mm-) wide concrete substrate, unless otherwise indicated.

G. Floating Cover Flotation Control: Connect drainage hoses in perimeter fold, sumps, or scuppers to pump or gravity drain system.

H. Liner Repairs: Repair tears, punctures, and other imperfections in geomembrane liner field and seams using patches of geomembrane liner material, liner-to-liner bonding materials, and bonding methods according to geomembrane liner manufacturer's written instructions. Apply bonding solvent or weld to contact surfaces of both patch and geomembrane liner, and press together immediately. Roll to remove wrinkles.

3.02 FIELD QUALITY CONTROL

A. Nondestructive Testing: Visually inspect seams and patches. Comply with ASTM D 4437 for Air Lance Test, Vacuum Box Testing, or Ultrasonic (High Frequency) Pulse Echo Testing or with GRI Test Method GM6, as applicable to geomembrane liner and seam construction. Record locations of failed seams and patches. For the record, individually number and date occurrences and details of leak and remedial action. Repair leaking seams and patches.

3.03 DISINFECTION

A. Disinfect the complete installation according to procedures in AWWA C652.

3.04 PROTECTION

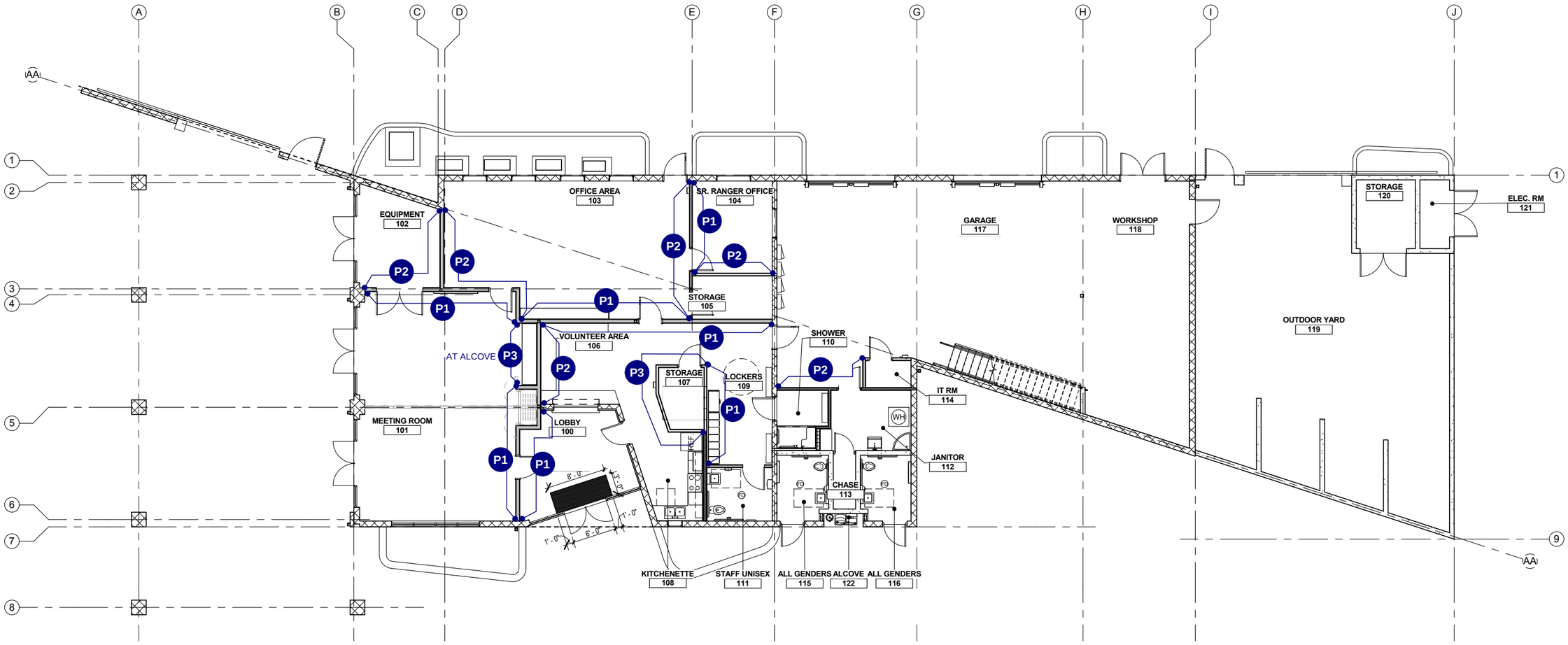
A. Protect installed geomembrane liner and floating cover according to manufacturer's written instructions. Repair or replace areas of geomembrane liner damaged by scuffing, punctures, traffic, rough subgrade, or other unacceptable conditions.

END OF SECTION

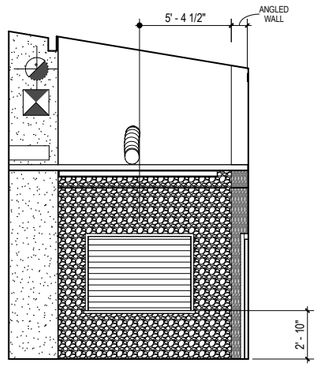
PAINT LEGEND

P1		SHERWIN WILLIAMS | SW7001 -MARSHMALLOW
P2		SHERWIN WILLIAMS | SW7546 - PRAIRIE GRASS
P3		SHERWIN WILLIAMS | SW6207 - RETREAT

NOTES:
1. WHERE PAINT COLOR NOT NOTED, USE P-1.
2. SEE FINISH SCHEDULE (SHEET A7.0) FOR PAINT SHEEN.
3. PAINT ALL EXPOSED SIMPSON CONNECTORS/HARDWARE.



Floor Plan | N.T.S.



100 LOBBY NORTH 1
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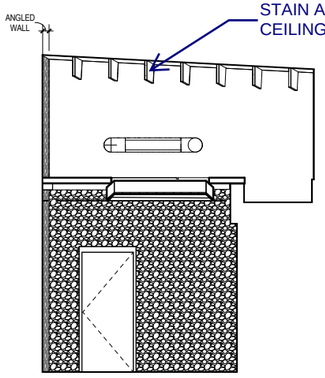
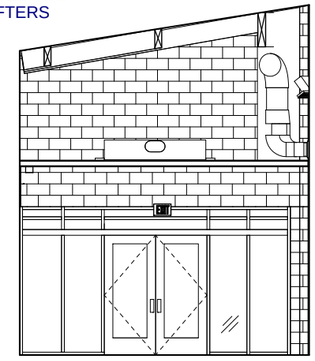


100 LOBBY EAST 2
N.T.S.



100 LOBBY SOUTH 3
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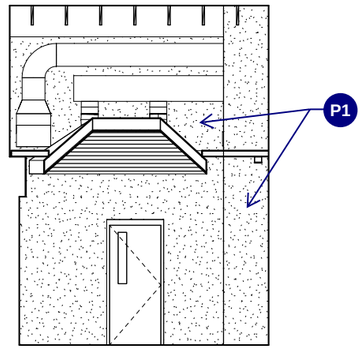

100 LOBBY WEST 4
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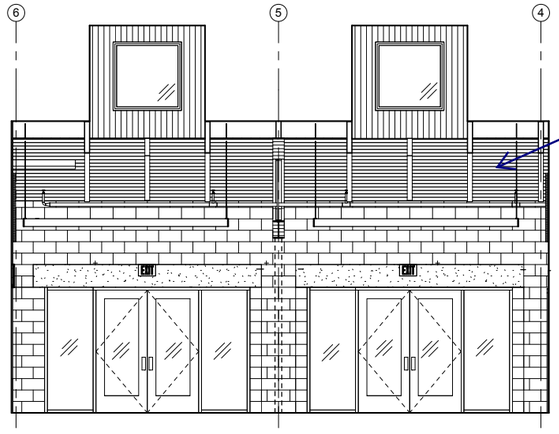

101 MEETING ROOM - A 5
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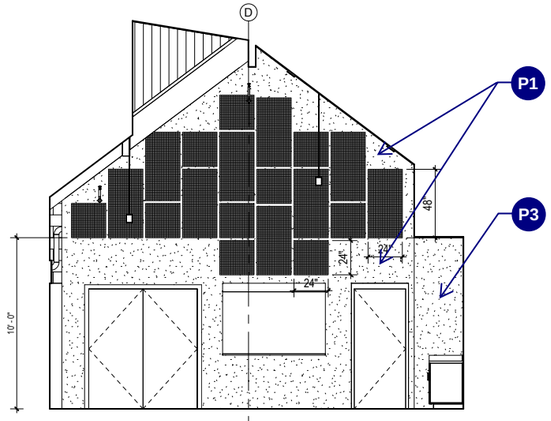

101 MEETING ROOM - B 6
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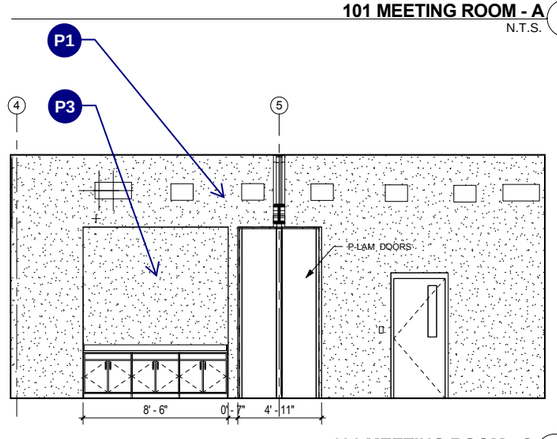

101 MEETING ROOM - C 7
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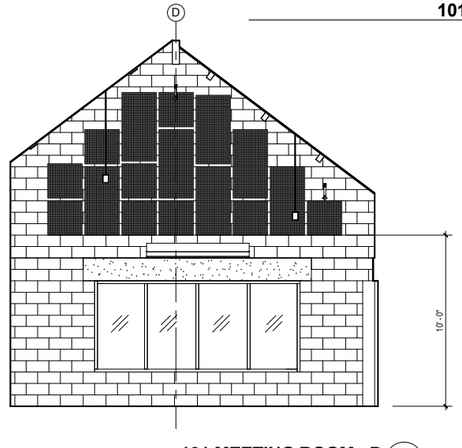


101 MEETING ROOM - D 8
N.T.S.

PAINT LEGEND

P1 SHERWIN WILLIAMS | SW7001 -MARSHMALLOW

P2 SHERWIN WILLIAMS | SW7546 - PRAIRIE GRASS

P3 SHERWIN WILLIAMS | SW6207 - RETREAT

NOTES:
1. WHERE PAINT COLOR NOT NOTED, USE P-1.

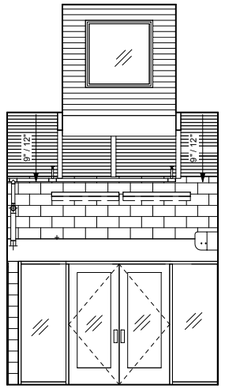
2. SEE FINISH SCHEDULE (SHEET A7.0) FOR PAINT SHEEN.

PAINT LEGEND

P1		SHERWIN WILLIAMS | SW7001 -MARSHMALLOW
P2		SHERWIN WILLIAMS | SW7546 - PRAIRIE GRASS
P3		SHERWIN WILLIAMS | SW6207 - RETREAT

NOTES:
1. WHERE PAINT COLOR NOT NOTED, USE P-1.

2. SEE FINISH SCHEDULE (SHEET A7.0) FOR PAINT SHEEN.



102 EQUIPMENT - A 9
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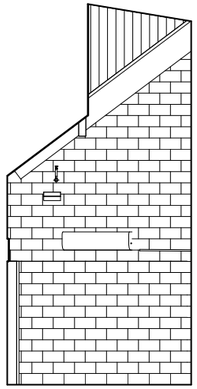

102 EQUIPMENT - B 10
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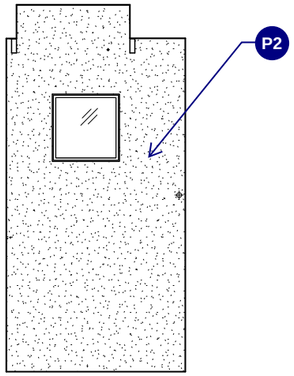

102 EQUIPMENT - C 11
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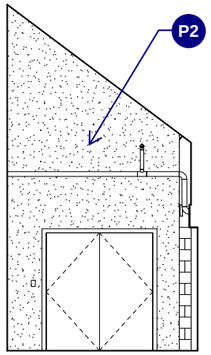

102 EQUIPMENT - D 12
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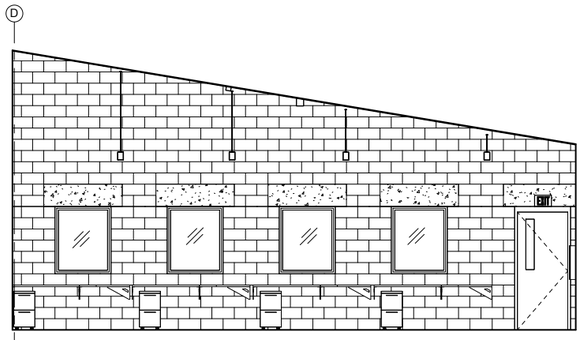

103 OFFICE - A 1
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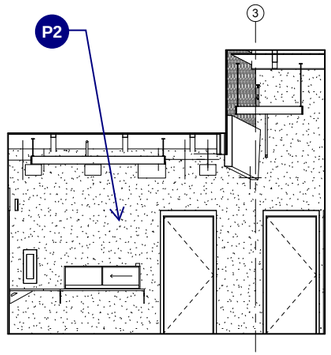

103 OFFICE - B 2
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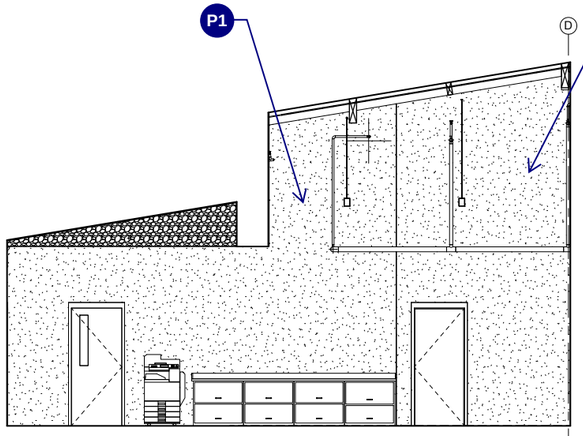

103 OFFICE - C 3
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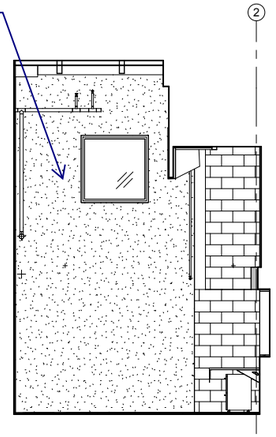

103 OFFICE - D 4
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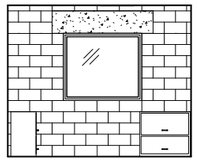

104 RANGER OFFICE - A 5
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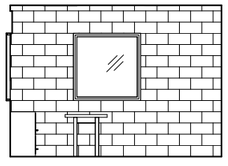

104 RANGER OFFICE - B 6
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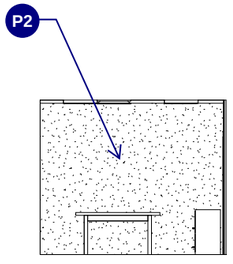

104 RANGER OFFICE - C 7
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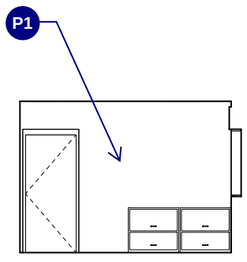
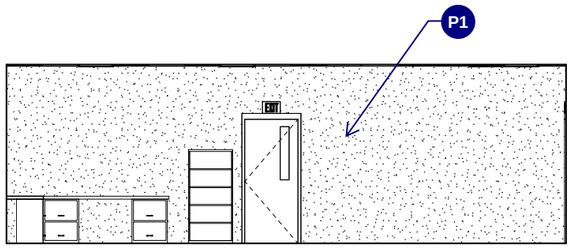


104 RANGER OFFICE - D 8
N.T.S.

Elevations | N.T.S.



106 VOLUNTEER AREA - A 1
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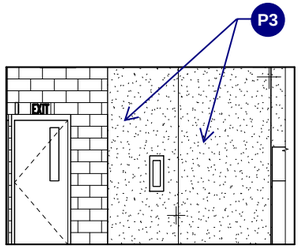

106 VOLUNTEER AREA - B 2
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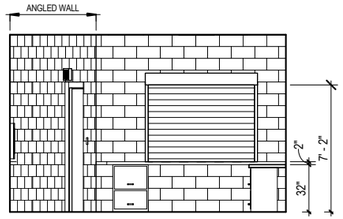

106 VOLUNTEER AREA - C 3
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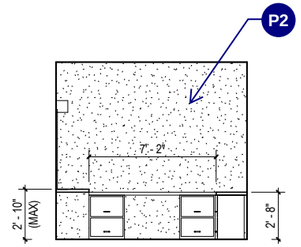
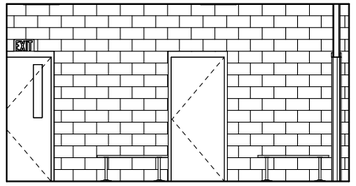


106 VOLUNTEER AREA - D 4
N.T.S.

PAINT LEGEND

- P1 — SHERWIN WILLIAMS | SW7001 -MARSHMALLOW
- P2 — SHERWIN WILLIAMS | SW7546 - PRAIRIE GRASS
- P3 — SHERWIN WILLIAMS | SW6207 - RETREAT

NOTES:
1. WHERE PAINT COLOR NOT NOTED, USE P-1.
2. SEE FINISH SCHEDULE (SHEET A7.0) FOR PAINT SHEEN.



109 LOCKERS - B 5
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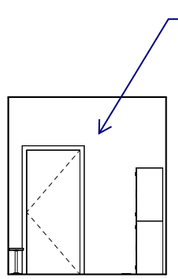

109 LOCKERS - C 6
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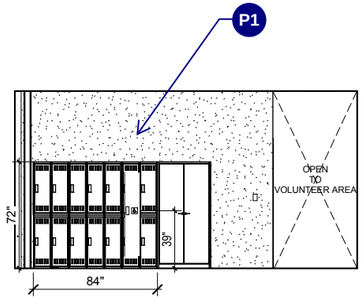

109 LOCKERS - D 7
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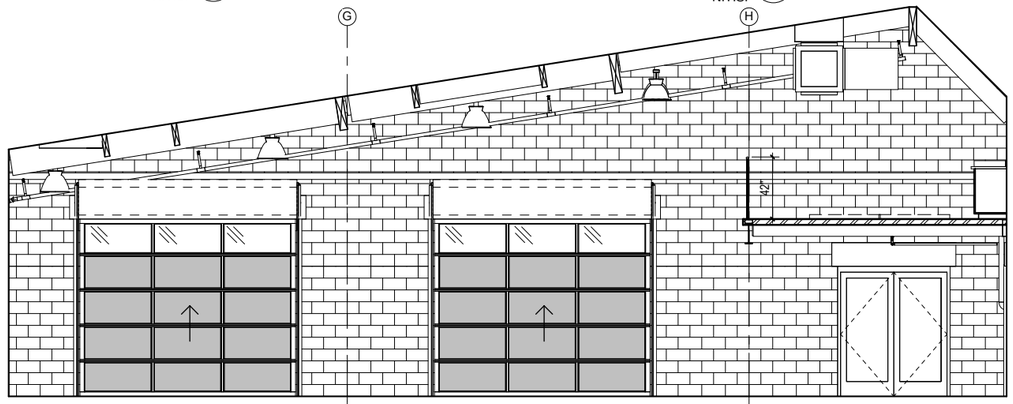
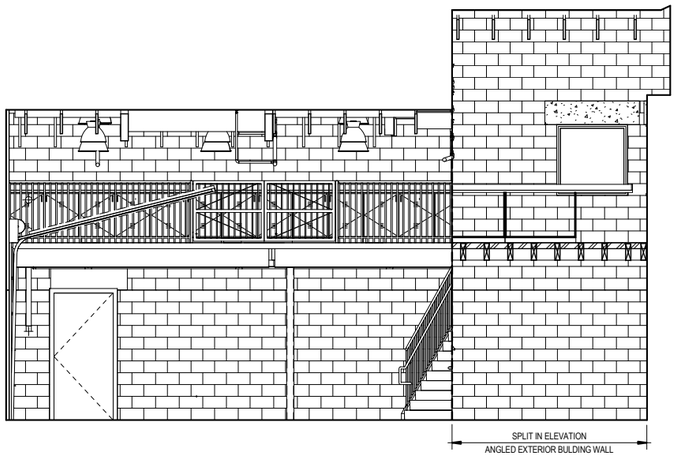
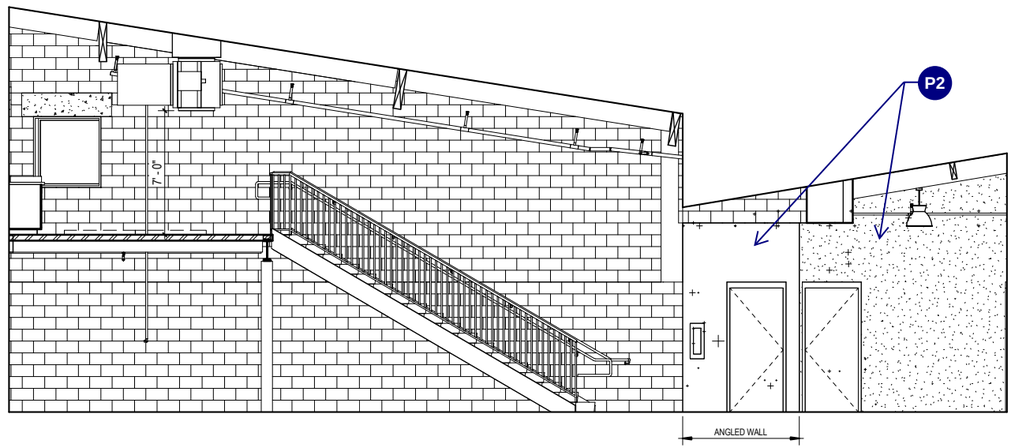


117 GARAGE - A 9
1/4" = 1'-0"

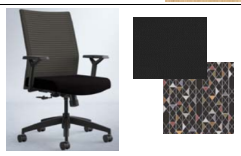


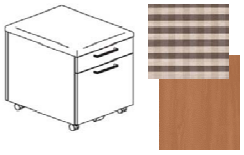
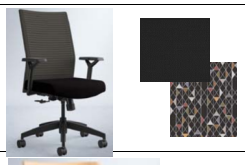
117 GARAGE - B 10
N.T.S.



117 GARAGE - C 11
N.T.S.

Mission Trails Regional Park
Furniture & Equipment List
Note: Basis of Design Products - Subject to compliance with requirements, product name or designation or comparable product.

Room Number	Room Name	Item	Make/Model	Color / Finish	Product Image	Quantity	Notes
100	Lobby	Lobby chair	National Reno Lounge	Fabric: Knoll - Nature Walk - Compass; Arm Finish: Wilsonart - Tuscan Walnut		2	
101	Meeting Room	Table	30"x72" Alulite A306HL; H style legs	Walnut		8	O.F.O.I
101	Meeting Room	Chair	Hon - Smartlink Stacking Chair HSS4L-18B	Shell - Mulberry; Frame - Platinum Metallic		32	O.F.O.I
101	Meeting Room	Roller shades	Mechoshade	Thermoveil Satin/Diamond Weave - 3312 Stone		3	See plans & window schedule for window sizes
103	Office Area	Workstation	Kimball Office - Priority	Laminate: Wilsonart - Monterey Oak		4	
103	Office Area	Mobile ped w/ cusion top	Kimball Office - Priority	Laminate: Wilsonart - Monterey Oak; Seat Fabric: Knoll - Yeni - Volcano		4	
103	Office Area	Task chair	Sona Task Chair	Seat fabric: Knoll - Nature Walk - Compass; Mesh back: Black		4	
103	Office Area	Bookcase	TBD	TBD		TBD	O.F.O.I
103	Office Area	Roller shades	Mechoshade	Thermoveil Satin/Diamond Weave - 3312 Stone		4	See plans & window schedule for window sizes

Room Number	Room Name	Item	Make/Model	Color / Finish	Product Image	Quantity	Notes
104	Sr. Ranger Office	Workstation	Kimball Office - Priority	Laminate: Wilsonart - Tuscan Walnut		1	
104	Sr. Ranger Office	3-drawer file cabinet	Kimball Office - Priority	Laminate: Wilsonart - Tuscan Walnut		1	
104	Sr. Ranger Office	Mobile ped w/ cusion top	Kimball Office - Priority	Laminate: Wilsonart - Tuscan Walnut; Upholstery: Knoll - Yeni - Volcano		1	
104	Sr. Ranger Office	Task chair	Sona Task Chair	Seat fabric: Knoll - Nature Walk - Compass; Mesh back: Black		1	
104	Sr. Ranger Office	Guest chair	SitOnIt - Focus Side Chair	Seat fabric: Knoll - Yeni - Volcano; Back - Wilsonart - Tuscan Walnut		2	
104	Sr. Ranger Office	Roller shades	Mechoshade	Thermoveil Satin/Diamond Weave - 3312 Stone		1	See plans & window schedule for window sizes
106	Volunteer Area	Task chair	Sona Task Chair	Seat fabric: Knoll - Nature Walk - Compass; Mesh back: Black		2	

Room Number	Room Name	Item	Make/Model	Color / Finish	Product Image	Quantity	Notes
108	Kitchenette	Refrigerator	Amana / ABB1924BR	Stainless Steel		1	ADA accessible refrigerator with bottom freezer
108	Kitchenette	Hood	GE / JVX530SSJSS	Stainless Steel		1	Under-cabinet mount
108	Kitchenette	Electric Range	GE / JB450RK	Stainless Steel		1	ADA accessible
108	Kitchenette	Undercounter Ice Maker	Summit / BIM44GADA	Stainless Steel		1	ADA accessible
108	Kitchenette	Microwave	GE / PES72227SLSS	Stainless Steel		1	Countertop

SUPPLEMENTARY SPECIAL PROVISIONS

APPENDICES

APPENDIX A

REVISED FINAL MITIGATED NEGATIVE DECLARATION AND SITE DEVELOPMENT PERMIT

City of San Diego
Development Services

Land Development
Review Division
(619) 446-5460

REVISED **BINDER**

FINAL

Mitigated Negative Declaration

LDR No. 40-0524
SCH No. 2001091006

SUBJECT: Mission Trails Regional Park - Multi-Use Staging Area Project: APPROVAL of a SITE DEVELOPMENT PERMIT (LDR No.40-0524) to allow the development of a twelve-acre, multi-use staging area to improve access to the City's Mission Trails Regional Park by horse riders, hikers, and bicyclists to the existing park trail system. The proposed improvements include a 5,000-square-foot, main structure containing park maintenance facility, park ranger offices, conference room, display room with information counter, park staff restroom with shower, garage, group kitchen, public restrooms, and storage room, a 2,300 s.f. covered group picnic shelter attached to the west side, and a screened storage yard attached to the east side. There would be a separate, 425 s.f. service building containing public restrooms, 15-space parking lot for horse trailers, 49-space parking lot for other vehicles, horse corrals, two multi-purpose rings, open BBQ area, picnic tables, horse manure storage bins, minimal security lighting, and internal loop access road. The maximum height of the main structure would be 26 feet, 10 inches; the height of the roof over the group picnic area would be a maximum of 18 feet, 9 inches. The project site is located in the northeastern portion of Mission Trails Regional Park about 300 yards east of the Mast Boulevard underpass of SR 52. The site is bounded by the right-of-way of SR 52 to the north, the drainage out of Little Sycamore Canyon to the west, and a Caltrans mitigation site and the San Diego River to the south.
Applicant: City of San Diego, Park and Recreation Department

I. **PROJECT DESCRIPTION:** See attached Initial Study.

II. **ENVIRONMENTAL SETTING:** See attached Initial Study and Biological Survey Report.

III. **DETERMINATION:**

The City of San Diego has conducted an Initial Study and determined that the proposed project as mitigated/designed will not have a significant environmental effect and the preparation of an Environmental Impact Report will not be required.

Please note: Based on input by the California Department of Fish and Game, the mitigation measure regarding avoidance of potential, significant impacts to any nesting raptor during the breeding season has been refined. (See following MMRP.)

IV. DOCUMENTATION:

The following mitigation measures and attached Initial Study documents the reasons to support the above determination.

V. MITIGATION MEASURES:

Biological Resources

1. The proposed development of the 11.77-acre project site, would result in the loss of 0.67 acre of coastal sage scrub, 0.41 acre of broom baccharis scrub, and 10.0 acres of non-native grasslands; this impacted area includes 2.2 acre portion of a strip currently in the Multi-Habitat Planning Area (MHPA), containing non-native grassland. This impact is proposed to be mitigated by a 6.46-acre area adjoining the development site to the west, containing 2.62 acres of broom baccharis scrub, 1.9 acres of coastal sage scrub, 1.3 acres of non-native grasslands, and 0.30 acre of non-native grassland. (See Tables 6 and 7 of the attached biological resources report.)

2. The Parks and Recreation Department, the applicant, has agreed to use portion of the excess development area towards project mitigation and for the proposed boundary adjustment. City MSCP staff has reviewed and expressed preliminary support for the proposed boundary adjustment for 2.2 acres within the MHPA and required mitigation of 6.08 acres of impacts to sensitive vegetation. This boundary adjustment and mitigation shall be implemented through the inclusion of 6.46-acre mitigation area into the MHPA. (See attached Figure 3.)

3. Prior to the start of site grading, a qualified biologist shall attempt to relocate the San Diego ambrosia *(Ambrosia pumila)* previously identified on the project site. This focused survey shall occur in May, June, and/or July (prior to site grading) during the season when this narrow endemic is most likely to be detected if still present. If this sensitive plant is found on site, the plant shall be transplanted to an appropriate, protected site. A 5-year monitoring program shall be required to provide assurances for its long-term success. The program should be consistent with the City of San Diego Mission Trails Regional Park San Diego Ambrosia Management Plan (May 15, 2000). The plan shall be approved by the program manager of the City's MSCP and the Assistant Deputy Director of LDR/EAS prior to project construction.

4. Upon beginning of operations, the horse manure storage units shall be sealed and a cowbird management program (August 16, 2000 City memo) shall be implemented, as required by the City's MSCP Subarea Plan (page 16 and 54). The method for sealing the manure storage areas and manure removal/monitoring

on trails adjacent to riparian areas within the park shall be included as an element (preventative measure) of the cowbird trapping and management program. The cowbird management program shall be approved by the program manager of MSCP and the Assistant Deputy Director of LDR/EAS prior to project construction.

5. In order to minimize the proliferation of brown-headed cowbirds, the City's Park Rangers shall develop and enforce a program to ensure that equestrian users of the staging area, clean up horse manure and dispose of it properly in the sealed storage units. Park rangers shall be tasked (on a year-round basis) to patrol the staging area to make sure the lids are kept closed, and to pick up any manure on the ground outside the storage units. In addition, the City Park and Recreation Department shall implement an ongoing cowbird trapping program to remove any cowbirds attracted to site, the river crossings, and the adjacent Caltrans' least Bell's vireo mitigation site. The cowbird trapping program shall be developed and implemented by the City Park and Recreation Department; this program is to be implemented as long as the multi-use staging area accommodates equestrian uses. The cowbird trapping program must be approved by the program manager of MSCP and the Assistant Deputy Director of LDR/EAS , prior to the issuance of a grading or the approval of improvement plans. In addition, the approved program shall be submitted to State Fish and Game and US Fish and Wildlife Service prior to the start of construction on the project site.

6. To discourage the parasitic cowbird predation on least Bell's vireo nests and reduction of the potential fouling of the river waters from horse manure. Removal of horse manure within 500 feet of the two trail crossings of the San Diego River shall occur as a minimum, four days each week during the breeding season of the endangered least Bell's vireo (between March 15 and September 15); during rest of the year, manure removal shall occur as a minimum, on a weekly basis.

7. The project includes grading which approaches the area containing mule fat scrub west of the northern extent of the proposed grading. The final design/grading plans of the project shall include accurate mapping of these habitats to ensure that the project site can be designed/graded to avoid direct impacts to this sensitive wetland habitat. In addition, all construction/grading activities shall be monitored by a qualified biologist to ensure that adjacent habitat areas are not inadvertently impacted. The permitted limits of construction/grading shall be clearly staked and monitored.

8. In order to assure that the endangered least Bell's vireo in the adjacent Caltrans mitigation site are not adversely affected by construction/grading activities during the listed bird's breeding season (March 15 to September 15), no clearing, grubbing, grading, or building activities would be permitted to occur during the breeding season if the construction noise levels exceed 60 dB (hourly average) or exceed the ambient noise level if the ambient level already exceeds 60 dB (hourly average) within the Caltrans mitigation site occupied by the least Bell's vireo,

unless adequate noise attenuation measures (i.e. noise barrier) are implemented. If construction/grading activities is anticipated during the breeding season, protocol surveys of the area within feet of the site by a qualified biologist shall be required prior to start of construction/grading. If nesting vireos are identified, construction must cease for the remainder of the breeding season unless a qualified acoustician can demonstrate that with or without noise attenuation measures, construction/grading noise levels will not exceed 60 dB (hourly average) within vireo-occupied portions of the surveyed area.

9. Any activity into the least Bell's vireo breeding season (March 15 to September 15) shall be reported to the respective program managers of the City's MSCP and EAS. Intrusion into the breeding season shall require the submittal and approval of the survey results and/or the noise study by the program manager of MSCP and the Assistant Deputy Director of LDR/EAS prior to start or continuance of construction/ grading activities.

10. In order to assure that the threatened California gnatcatchers in the adjacent MHPA areas are not adversely affected by construction/grading activities during the listed bird's breeding season (March 1 to August 15), no clearing, grubbing, grading, or building activities would be permitted to occur during the breeding season if the construction noise levels exceed 60dB (hourly average) or exceed the ambient noise level if the ambient level already exceeds 60 dB (hourly average) within the adjacent habitat occupied by the gnatcatcher, unless adequate noise attenuation measures (i.e. noise barrier) are implemented. If construction/grading activities is anticipated during the breeding season, protocol surveys of the area within feet of the site by a qualified biologist shall be required prior to start of construction/ grading. If nesting gnatcatchers are identified, construction must cease for the remainder of the breeding season unless a qualified acoustician can demonstrate that with or without noise attenuation measures, construction/grading noise levels will not exceed 60 dB(hourly average) within vireo-occupied portions of the surveyed area.

11. Any construction/grading activity into the California gnatcatcher breeding season (March 1 to August 15) shall be reported to the program managers of the City's MSCP and EAS. Intrusion into the breeding season shall require the submittal and approval of the survey results and/or the noise study by MSCP and EAS prior to start or continuance of construction/ grading activities.

12. White-tailed kites and red-shouldered hawks have been observed during biological surveys of the project site; these raptors forge on the gophers, jackrabbits, and woodrats observed in the extensive, non-native grassland areas in the immediate project vicinity. In order to avoid indirect impacts to nesting raptors in the project vicinity, construction/ grading during the raptors breeding

season (December 1 to June 30) shall be avoided unless a survey is conducted by a qualified biologist to confirm that no nesting raptors are located 500 feet of the construction/grading area. If nesting raptors are identified, construction/grading activity shall not be allowed until the nesting season is completed, or unless suitable mitigation measures are approved by the program manager of MSCP and the Assistant Deputy Director of LDR/EAS.

13. The final improvement plans shall ensure that low intensity lighting is used and that it is shielded and directed away from adjacent MHPA areas.

14. The final improvements plans shall include use of signage, fencing, and landscaping to direct park users away from sensitive areas including the adjacent Caltrans mitigation site. Specifically, the final plans shall incorporate use of native vegetation and use of dense tree plantings to buffer the parking lot in the western extent of the project from the Caltrans mitigation site and the adjacent drainage to the west.

15. Park rangers shall monitor the park trails to ensure that horse manure accumulation on the trails, is not attracting brown-headed cowbirds, or resulting in water quality impacts to the adjacent creek crossing to the west of the proposed development. If impacts do occur, appropriate remedial, trail maintenance measures shall be implemented immediately upon detection.

Historical Resources (Archaeology)

The active management measures recommended for archaeological site CA-SDI-203 by the archaeology consultant (as mentioned in the Affinis letter dated May 14, 2001), shall be included as mitigation measures. Of specific concern is the treatment of the Oak Canyon and Grasslands Loop Trails as they cross this recorded significant site; at these specific sections of the trails, the trail surface must be covered/protected such that increased use of these sections do not expose the underlying midden. (See attached Figure 2.) Once covered or protected, periodic inspection/ maintenance of these sections by Park rangers must occur to assure that the path is not eroding into this archaeological site.

Water Quality/Runoff Control

1. The southeastern portion of the equestrian center drains south across the existing SDG&E road and into the Caltrans restoration site. These flows must be directed away from the mitigation site or as a minimum, controlled/filtered prior to entering the mitigation site.

2 All runoff from parking areas as well as horse corral areas, shall be initially directed to grassy-swale type, detention basins and made to terminate at rip-rapped deceleration structures prior to flowing into the Caltrans mitigation site and/or the San Diego River.

3. These grassy-swale, detention basins shall be maintained, as a minimum, twice yearly, before and after the rainy season, and that horse manure in the corral and multi-purpose ring areas and on the interior trails shall be inspected daily by Park personnel and removed on a weekly basis. (See attached Figures 4 and 6.)

4. To discourage the parasitic cowbird predation on least Bell's vireo nests and reduction of potential fouling of the river waters from horse manure. Removal of horse manure within 500 feet of the two trail crossings of the San Diego River shall occur at least four times each week during the breeding season of the endangered least Bell's vireo (between March 15 and September 15); during rest of the year, manure removal shall occur at least, on a weekly basis.

Contingency Measure

If a septic system is proposed to be used on site for the public restrooms, the kitchen, and whatever wastewater is generated from the maintenance facility, the leach lines/field shall be located such that there would be no direct influent flows into the 100 year floodplain of westerly drainage, the detention basins on site, the Caltrans mitigation site, and/or the San Diego River. Measures shall be inplace to prevent mixture of flows from the leach fields into the runoff detention basins. The design/placement of leach fields shall be approved by EAS/MSCP prior to its submission to the County Health Department for approval. The review by EAS/MSCP is to assure that the placement of leach fields would not directly or indirectly adversely effect adjoining and/or downstream biological resources.

VI. PUBLIC REVIEW DISTRIBUTION

Draft copies and notice of this Mitigated Negative Declaration (LDR No.40-0524) were distributed to:

City of San Diego
- Mayor's Office - Tom Story (MS 11A)
- Councilmember Madaffer, District 7
- Park and Recreation - Marcia McLatchy (MS 10A)
  Robin Shifflet (MS 35)
- Wetlands Advisory Council - Robin Stribley (MS 35A)
- Historical Resources Board (MS 4A)
- Mission Trails Park Ranger (MS 35A)
- MSCP Planning - Jeanne Krosch (MS 5A)

State Clearinghouse (46)

Environmental Protection Agency (19)
Regional Water Quality Control Bd (44)
Calif. Dept. of Fish and Game (33)
Caltrans (MS 980)
US Army Corps of Engineers (26)
US Fish & Wildlife Service (23)

Navajo Community Planners (336)
San Carlos Area Council (338)
Tierrasanta Community Council (462)
Murphy Cyn Community Council (463)
E. Elliott Advisory Committee (466)
MT Park CAC - M.Pent (465)
MT Park CAC - W. Odenning (341)
SANDAG (108)
MCAS - Miramar (24)
Padre Dam Water District
10887 Woodside, Santee 92072
County Health Department
City of Poway (103)
Santee Comm. Planning Grp (340)
City of Santee (466A)

Sierra Club (165)
Audubon Society (167)
CNPS (170)
Endangered Habitats League (182)
Earth Times (165A)
Center for Bio Diversity (176A & 176)
SDCAS (218)
Kumeeyaay Cultural Repatriation Comm. (225)
Jim Peugh (324)
Dorothy Leonard, MT CAC,
6916 Cibola Rd., SD 92120-1708
Tierrasanta Times - Deanna Spehn (143)
Chris Laidlaw (342)
Dr. Florence Shipek (208)
Dr Lynne Christenson (208A)
South Coastal Information Center (210)
San Diego Archaeological Center (212)
Save Our Heritage Organization (214)
Ron Christman (215)
Louis Guassac (215A)
Native American Distribution (notice only)

VII. RESULTS OF PUBLIC REVIEW:

( ) No comments were received during the public input period.

( ) Comments were received but they did not address the Mitigated Negative Declaration finding and/or accuracy/completeness of the Initial Study. No response is necessary. The letters are attached.

(✓) Comments addressing the findings of the draft Mitigated Negative Declaration and/or accuracy/completeness of the Initial Study were received. The comment letters received and associated staff responses follow.

Copies of the Mitigated Negative Declaration and any Initial Study material and referenced previous documents are available in the office of Land Development Review for review, or available for purchase at the cost of reproduction.

Anne Lowry, Sr. Environmental Planner
Development Services Department

August 30, 2001
Date of Draft Report

October 10, 2001
Date of Final Report

October 17, 2001
Date of Revised Final Report

STATE OF CALIFORNIA

Governor's Office of Planning and Research

State Clearinghouse

Gray Davis
GOVERNOR

Steve Nissen
DIRECTOR

October 4, 2001

John M. Koval
City of San Diego
202 C Street MS 4A
San Diego, CA 92101

Subject: Mission Trails Regional Park-Multi Use Staging Area
SCH#: 2001091006

Dear John M. Koval:

The State Clearinghouse submitted the above named Negative Declaration to selected state agencies for review. The review period closed on October 3, 2001, and no state agencies submitted comments by that date. This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act.

Please call the State Clearinghouse at (916) 445-0613 if you have any questions regarding the environmental review process. If you have a question about the above-named project, please refer to the ten-digit State Clearinghouse number when contacting this office.

Sincerely,

Terry Roberts

Terry Roberts
Senior Planner, State Clearinghouse

- 1 -

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
916-445-0613 FAX 916-323-3018 WWW.OPR.CA.GOV/CLEARINGHOUSE.HTML

Document Details Report
State Clearinghouse Data Base

SCH# 2001091006
Project Title Mission Trails Regional Park-Multi Use Staging Area
Lead Agency San Diego, City of

Type Neg Negative Declaration

Description Development of 12-acre multi-use staging area to improve access to park trails. Proposal includes 5,000 sf park facility building, horse corrals, 15-space horse trailer parking area, 49-space vehicle parking area and various day use facilities.

Lead Agency Contact

Name John M. Koval
Agency City of San Diego
Phone 619-235-5207 **Fax**
email
Address 202 C Street MS 4A
City San Diego **State** CA **Zip** 92101

Project Location

County San Diego
City San Diego
Region
Cross Streets SR 52/ Most Boulevard
Parcel No.
Township **Range** **Section** **Base**

Proximity to:

Highways 52
Airports
Railways
Waterways San Diego River
Schools W. Hills High School
Land Use Regional Park /unzoned

Project Issues Archaeologic-Historic; Drainage/Absorption; Flood Plain/Flooding; Noise; Public Services; Recreation/Parks; Septic System; Soil Erosion/Compaction/Grading; Vegetation; Water Quality; Wetland/Riparian; Wildlife; Landuse

Reviewing Agencies Resources Agency; Department of Fish and Game, Region 5; Department of Forestry and Fire Protection; Office of Historic Preservation; Department of Parks and Recreation; California Highway Patrol; Caltrans, District 11; Regional Water Quality Control Board, Region 9; Native American Heritage Commission; State Lands Commission

Date Received 09/04/2001 **Start of Review** 09/04/2001 **End of Review** 10/03/2001

Note: Blanks in data fields result from insufficient information provided by lead agency.

SAN DIEGO AUDUBON SOCIETY
2321 Morena Boulevard, Suite D • San Diego CA 92110 • 619/275-0557

September 29, 2001

VIA FACSIMILE: 619-446-5499

Lawrence C. Monserrate, Assistant Deputy Director
City of San Diego, Development Services Department
202 C Street
San Diego, California 92101

Dear Mr. Monserrate:

Subject: Mission Trails Park - Multi-use Staging Area Project,
LDR No. 40-0524, Draft Mitigated Negative Declaration

We urge that this project be substantially modified and reduce in scale so that an MND could be appropriate or that an EIR be written to fully examine the full impacts of the projects, whether the proposed mitigation is adequate and feasible, and identify less environmentally damaging alternative projects and more effective mitigation packages. The project has the potential for causing a very large negative impact on the sensitive wildlife, natural vegetation, invasive species, water quality, and the nature of Mission Trails Park and the MHPA. The Negative Declaration states that the project will have substantial environmental impacts. The document further states that, with the proposed mitigation measures, the project will not have a significant effect on the environment. However, the document fails to provide any information to show that the proposed mitigation measures will reduce the impacts to an insignificant level or that the mitigation can actually be implemented. We will discuss this problem with respect to a few key issues. 1

NEED FOR AN EIR TO ADEQUATELY ANALYZE THIS PROJECT

The Negative Declaration provides inadequate CEQA review. An EIR must be prepared since the proposed project, as it is presented, may result in one or more significant impacts. The proposed MND violates CEQA by concluding, without evidence, that the project's environmental impacts are not significant. A negative declaration may only be prepared when no significant evidence exists, in light of the whole record, that the project may have a significant environmental effect (Pub. Res. Code sec. 21080(c)); CEQA Guidelines sec. 15070). If there is any substantial evidence of a potentially significant effect (and the requirements for preparation of a mitigated negative declaration cannot be met), a Lead Agency may not prepare a negative declaration. Where a negative declaration finds that a project will not have a significant effect, the initial study must provide the factual basis for such a finding. See Sundstrom v. County of Mendocino, 208 Cal. App. 3d 296 (1988). The proposed MND fails to provide any evidence to support finding that impacts to agricultural land, public services, community character and water quality, among other impacts, will be insignificant. This clearly does not constitute "substantial evidence" to support the proposed MND's findings of no impact. 2

STAFF RESPONSE #1: The determination of the appropriateness of this subject Mitigated Negative Declaration was made, pursuant to CEQA, based on the initial study and the extended initial study - the site-specific technical studies including those for biology (attached), historic resources, and geotechnical considerations. There were no significant environmental impact which was not mitigated to below a level of significance, and the mitigation measures were agreed upon by the applicant City Park and Recreation Department. Therefore, an Environmental Impact Report (EIR) was not required.

It should be noted that this multi-use staging/equestrian center was envisioned in the park master plan for Mission Trails. This center was analyzed in the certified August, 1996, Final EIR for the Multiple Habitat Conservation Program ((MSCP: LDR No.93-0287; SCH No.93121073) Figure 4.3-2 and page 4.3-96) In addition, this "30-40 acre equestrian center and buffer" was specifically left outside the Multi-Habitat Planning Area (MHPA), the implementing, planned preserve of the City's adopted MSCP. Please refer to the March, 1997, City of San Diego MSCP Subarea Plan (page 16 and Figure 3). The larger issues of adverse effects on the regional wildlife preserve were previously considered in the EIR for the MSCP, and the exclusion of this project site from the MHPA, was agreed upon by the wildlife agencies as disclosed in the MSCP implementing document, the Subarea Plan. The site-specific mitigation measures (disclosed in this subject MND) regarding sensitive biological resources within the adjoining MHPA, required for this project are consistent with the adjacency guidelines of the MSCP Subarea Plan.

STAFF RESPONSE #2: Contrary to the commenter's assertion and as evidenced by the preparation of this Mitigated Negative Declaration, it was determined that significant impacts would occur to biological resources, historical (archaeological) resources, and water quality. To reduce or avoid these potential significant impacts, mitigation measures were required; the associated Mitigation Monitoring and Reporting Program (MMRP) would be required to be formally adopted by the decisionmakers if this project is approved. (Also refer to previous Staff Response #1.)

It should be noted the commenter's cited CEQA court case is not relevant to this project or the subject MND. The attached initial study checklist used for this CEQA analysis is consistent with CEQA guidelines and it is annotated (per City procedure). The project site is located within an existing designated regional park within a fully developed, urban, municipality; it is not designated for agricultural uses. Considering this existing use and designation and the proposed development on 12 acres, there can be no adverse effect on any significant agricultural resource or potential. In regard to the cited public services or community character, the project is the development of a planned recreational facility improvement within an existing urban park consistent with adopted plans; there are no issues with schools or recreation. This regional park is patroled and maintained by assigned park rangers stationed at the park visitors center. The proposed structures are sufficiently buffered with adequate brush management and provision for a fire hydrant is proposed. (See attached Figure 4.) Contrary to the commenter's assertion, water quality impact was identified in the checklist as potentially significant, and the required mitigation measures were disclosed in the distributed draft MND; these measures would be adopted in the MMRP. Unlike the cited court case, mitigation measures for this project impacts, were identified and specified in the distributed, draft MND.

Rather, CEQA requires an EIR be prepared in this instance. Under CEQA, all projects which may result in one or more significant adverse environmental impacts must be the subject of an EIR. This is a very low threshold for an EIR. As the California Supreme Court has held, an EIR must be prepared when an agency is presented with a "fair argument" that a project may have a significant environmental effect on the environment, even if there is also substantial evidence to indicate that the impact is not significant, No Oil Inc., v. City of Los Angeles, 13 Cal. 3d 68, 75 (1974). Both the courts and the CEQA Guidelines make clear that even where there are conflicting opinions regarding the significance of an impact, the local agency must treat the impact as significant. As the court of appeal has stated:

> "If there is substantial evidence that the proposed project might have a significant environmental impact, evidence to the contrary is not sufficient to support a decision to dispense with the preparation of an EIR and adopt a negative declaration, because it could be 'fairly argued' that the project might have a significant environmental impact. Stated another way, if the trial court perceives substantial evidence that the project might have such an impact, but the agency failed to secure preparation of the required EIR, the agency's action is to be set aside because the agency abused its discretion by failing to proceed 'in a manner required by law.'" (Public Resources Code section 21168.5)

3

Friends of "B" Street v. City of Hayward 106 Cal.App. 3d 988, 1002 (1980). Thus, where the question before the agency is whether a proposed project may cause significant environmental effects, the obligation to prepare an EIR may exist even where the agency can point to substantial evidence indicating that no effects will occur. The agency's task is not to weigh competing evidence and determine whether in fact a significant impact will occur; rather, the task is to determine whether substantial evidence exists such that there is a fair argument that a significant impact may occur.

1 3 1

Substantial evidence is presented below supporting a fair argument that the proposed project could cause significant impacts including, but not limited to paracitism of Least Bell's Vireo nests, water quality impacts, accelerated erosion of landforms, lighting impacts on the habitat of vireos and on other MHPA, and the invasion of non-native vegetation in the Park and the MHPA.

4

COWBIRD IMPACTS ON LEAST BELL'S VIREOS

It is well know that cowbirds are attracted by manure. Cowbird parasitism is a major threat to Least Bell's Vireo reproduction. The project area is near a mitigation site for vireos and other vireo habitat. The MND states the park rangers will see that horse manure at the staging area is picked up and stored in sealed containers. However the manure will be on the ground for unspecified, perhaps long, periods of time before it is picked up. Portions of it will remain after the bulk of it is picked up. The Park Department has very few park rangers. They are very often busy with urgent tasks especially when the park is being heavily used, which is when the area will need to be monitored to make sure people pick up after their horses, and when the rangers must remove the remaining manure. This mitigation measure will not be very effective. The MND does not provide any estimate of how many rangers would be added to make this mitigation measure work. Nor does it specify how many rangers will be available for this task. Considering Park Department funding levels, this mitigation measure simply will not, and can not, be adequately implemented. The MND also does not identify the impact on the vireos of the manure that is on the ground temporarily. The MND provides no support to its allegation that the impacts will not be significant.

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STAFF RESPONSE #3: The determination of the appropriateness of this subject Mitigated Negative Declaration was made, pursuant to CEQA Guidelines Section 15369.5, based on the initial study and the extended initial study. There were no significant environmental impact which was not mitigated to below a level of significance, and the mitigation measures were agreed upon by the applicant City Park and Recreation Department. Therefore, an Environmental Impact Report (EIR) was not required.

The commenter's cited CEQA case is not relevant to this project or subject MND. This 1975 case reinforced that the CEQA environmental review process occur prior to a discretionary approval. As stated previously and as evidenced by this comment letter, the mandated CEQA process has been followed prior to project consideration by the decisionmaking body. It should be noted that CEQA statute and guidelines have been recently amended/revised to formally recognize the appropriate use of a mitigated negative declaration.

The commenter's cited second CEQA case involved the use of a negative declaration for a proposal not consistent with the general plan. As disclosed in distributed draft MND (a negative declaration with guaranteed, specified mitigation measures), this proposal is consistent with the City's adopted regional wildlife conservation plan, the MSCP. (Also see previous Staff Response #1.) In addition, the project implements the park master plan.

STAFF RESPONSE #4: Comments noted. As previously stated potential, significant impacts to biological resources, historical resources and water quality and associated mitigation measures were identified and disclosed in the distributed draft MND. The proposed lighting as shown in attached Figure 4 is confined to four lights within the interior of the developed area; there are no proposed perimeter lighting which would adversely effect the adjoining MHPA areas. Runoff from the site would be initially directed to grassy swales for water quality control and channeled to rip-rap dissipators to reduce off-site erosion.

STAFF RESPONSE #5: The potential significant impact of cowbirds attracted by the proposal, on the endangered least Bell's vireo (LBV) was identified and disclosed in the initial study and the attached biological survey report of the distributed draft MND. In addition, specific required mitigation measures to reduce cowbird impacts were identified and disclosed. (See MMRP discussion.) In the proposed development, manure pickup is not only a potential impact to the endangered LBV but it could present a health issue for the park visitors to the proposed multi-use facility. It becomes a combined effort of cooperative horse riders, park rangers, and park grounds maintenance workers to pick up manure and place it in the proposed sealed containers. The commenter's cited worst case scenario of horse droppings perhaps remaining uncollected for long periods of time is unlikely. The City Park and Recreation Department estimates that the proposal would require two additional ground maintenance workers to operate this facility. The City working with a motivated Citizens Advisory Committee for Mission Trails Park, have been successful in the past in obtaining the funding/staffing to maintain/improve this regional park; there's no indication that this effective, cooperative effort would not continue into the future.

It should also be noted that the adjoining LBV mitigation site is currently an emerging riparian woodlands predominately covered by cottonwoods. While this is a valuable habitat, its use by the endangered LBV is questionable, and there is no active effort currently going to assure that this area becomes a more suitable, willow riparian woodland.

The MND also states that manure within 500 feet of the two trail crossings will be picked up four days a week during vireo breeding season. At best, that will mean that a very large quantity of manure will often be on the trails for up to two days. Further, how will two days of horse manure be collected in this area that is difficult to access? Some of the manure will be kicked off the trail by horses hooves. The MND does not state who will pick it up, what resources will be used to pay them and what quantity of manure will remain in the preserve after the removal. It is very likely that a significant portion of this manure will not be removed, or will at least stay near the vireo habitat for significant periods of time. The MND implies that manure outside of the 500 foot from the stream crossings will be left on the ground. Cowbirds are very mobile. This will attract cowbirds to within several hundred feet of the vireo habitat. How many cowbirds will be attracted to the vicinity of the vireo nesting habitat by the manure on the ground? To what degree will cowbirds be attracted to the area by the presence of horses themselves, due to the expectation that manure is usually found around horses? What will be the impact on neighboring vireo nesting due to these cowbirds? It is obvious that there will be an impact, very likely significant. The MND provides no real information nor logic to support its allegation that the mitigation measures will reduce the impact to an insignificant level. The environmental document must be more specific about quantifying the impact and the "take" of vireos that will result from the manure. Relevant examples and experimental information must be provided to support the allegation that the impact will be insignificant. 6

We understand that cowbird trapping can significantly reduce the parasitism impact, but that it takes a consistent commitment of experienced labor and the traps have to be tended every day. In populated areas, the cowbirds are sometimes released by park visitors that do not like to see them in captivity. This of course could result in loss of vireo nesting. Also do newly arrived cowbirds tend to lay a few eggs before being trapped? What agency will do the trapping? What level of successful experience do they have? How often is a cowbird expected to deposit a nest in a vireo nest in spite of the mitigation measures. What number of vireo nesting attempts will be unsuccessful due to cowbirds without the horse facility vs. with the horse facility? Is the funding to accomplish the cowbird trapping committed in perpetuity? What is the likelihood that the trapping will be fully funded? The environmental document must be upgraded to answer questions such as these to fully identify the potential environmental impact of this project as is required by CEQA. 7

If it is found that "take" occurs due to cowbirds, will horse use be prohibited during nesting season? If not, how many vireos would have to be lost for horse activity to be prohibited during nesting season? We urge that such a "take" limit be incorporated into the CEQA document as a mitigation measure. 8

WATER QUALITY

The MND identifies a few measures to reduce the water quality impacts of the horse manure. Even with these measures there will still be some water quality impacts. Examples are elevated levels of nutrients in streams, reduced BOD, and increased fecal levels.

Horses substantially accelerate trail wear. This causes trails, especially those on sloped areas to decay and erode much more quickly than without the horse use. This will cause siltation into streams and increases in turbidity, streambed sediment deposition, and degradation of downstream waterways and receiving waters. The erosion will be exacerbated when rain runs down the unvegetated gullies, gouged out by the hooves of the horses, carrying away the soil and manure that have been pulverized by the hooves. Again, this erosion will degrade waterways downstream from the trail. From hiking on trails also used by horses, we are 9

-4-

STAFF RESPONSE #6: Refer to previous Staff Response #5 for staffing needs.

The applicant City Park and Recreation Department will retain the services of John Griffith of Griffith Wildlife Biology to produce a cowbird management plan for the specific requirements of the proposed Multi-use Staging Area at Mission Trails Park and then the City will hire Griffith to implement the plan when the proposed facilities are built and in use. The City has obtained a cowbird plan for the Kumeyaay Lake area from Griffith Wildlife Biology, which gives criteria for trap set-up, trap servicing, quality control visits and trap take down. This plan could be expanded to include the Multi-Use Staging Area or the City will obtain a separate plan for the current project area.

The proposed cowbird management plan is the up-to-date method of reducing impacts on the endangered LBV. Cowbird trapping has been conducted by the wildlife agencies, in riparian areas throughout the county including the Sweetwater River and Tijuana River.

It should be noted that equestrians currently use the existing trail system within the Mission Trails Park including areas known to contain LBV's. The proposed project would facilitate horse riders; however, the amount of equestrian use engendered by these proposed improvement is moot at best. For this CEQA impact analysis, it was assumed that some increased use posed by the proposal would result in a potentially significant impact due to likely cowbird attraction. Therefore, mitigation measures have been required. In consideration of existing conditions, the mitigation measures consistent with current state of knowledge and practice were determined to be sufficient in reducing any added impacts to below a level of significance. Specific seasonal, spatial, and timing considerations were given to areas within the park, which are known LBV habitat during its breeding season. This MND is a regulatory tool, a disclosure CEQA document and it does not attempt nor required by CEQA to address a more comprehensive, academic/research approach as suggested by the commenter.

STAFF RESPONSE #7: See previous Staff Response #6. It should be noted that the draft MND was distributed to the US Fish and Wildlife Service (FWS) and the California Department of Fish and Game. In addition, City staff field checked the project site with FWS. In their joint comment letter (see Comments #'s 39 through 50) the wildlife agencies did not comment on the adequacy of a proposed cowbird trapping program as an acceptable measure to reduce this parasitic bird's impact on the LBV.

STAFF RESPONSE #8: The City pursuant to the adopted MSCP and its implementing agreement is required to manage its wildlife resources. Specifically, the City Park and Recreation staff through its natural resources management plan and the Planning Department's MSCP staff are charged to assure that existing LBV habitat within Mission Trails Park remains viable. But ultimately, it is the FWS which will determine that a "take" occurs. Also refer to previous Staff Response #7.

STAFF RESPONSE #9: The equestrian users will be confined to existing trails for equestrian use with signage and barriers and these trails are typically on the flat areas of the park or within the proposed multi-purpose ring. Erosion on trails caused by hiking, biking or equestrian is an ongoing maintenance and remediation task for the park rangers, and this problem is handled with varying, adaptive measures depending on the location and type of erosion. As stated previously, equestrian users are currently using the park and the existing trails. The applicant does not anticipate a significant increase in the number of equestrian users. This project will provide an area for equestrian users for parking and staging rather then current practice of parking on adjoining public streets and riding into the park.

aware that these impacts are significant. The MND does not acknowledge, identify the level of impact, propose mitigation measures to reduce this impact, or commit to the high levels of maintenance that would be required to control this impact, nor offer alternatives that avoid the impact. It must be upgraded to analyze this issue to satisfy the minimum requirements of CEQA.

10 The MND does not identify whether washdown of horses will be allowed at the project site. If it is, a high volume of runoff water will affect the nearby habitat. Also the runoff is likely to contain the soaps and shampoos that are used in large quantities for horses. The soaps, surfactants, and shampoos are very likely to impact the nearby wetland habitats. It is not clear that the runoff BMPs will be adequate to reduce this impact. The MND must identify whether washdowns will be allowed, or how they will be prevented, how much water and pollutants would be involved, and how the impacts would be mitigated to satisfy CEQA.

11 The MND mentions that the facility may depend on a septic system instead of hooking into the municipal sewer system. It then mentions a few commonplace measures that it would require to reduce the pollution from the septic system. It does not identify what residual water quality and habitat impacts a septic system would cause in a riparian wildlife area. It is very likely that invasive plant species will prosper in the area around and downstream of the septic field due to the roots accessing nutrients from the septic field. It seems inappropriate to allow the use of a septic system for a heavily used park facility adjacent to a sensitive wetland and riparian area.

If a municipal sewer connection is not possible we urge that the project be scaled back significantly so that self-contained composting toilets can provide for the project.

INVASIVE VEGETATION

12 Horses that live elsewhere will be brought to the proposed facility for riding. It is common knowledge that some of the seeds of weeds and other non-native vegetation, that are contained in feed or they eat while grazing, will be brought to Mission Trails park and deposited in their manure along the trails. Seeds will also be dropped from the hair and hooves of the horses. Some of seeds will spread downhill, downwind, and downstream of the trails where they will be harder to find and remove. It takes a good deal of education and skill to identify what plants are native and which are weeds that should be pulled. This will exacerbate the already difficult problem of keeping invasive plants from the Park and from the MHPA. This is a potentially significant impact, but it is not addressed in the MND.. The environmental document must be upgraded to address the potential magnitude of this impact and ways to avoid or mitigate it. The document must also define a reliable means to finance the monitoring for and removal of invasive vegetation brought by horses to areas throughout the park.

I-5

LIGHTING

13 The MND offers to use low intensity lighting that is shielded and directed away from adjacent MHPA areas. It is unlikely that just those measures alone will reduce the impact on wildlife to below a level of significance. No information is provided to justify that these measures will reduce the impact to less than significant - just an unsupported allegation. It is very likely that these measures, plus a large buffer between the habitat and the lighting source, are required. Also, the statement in the MND appears to assume that lighting to sensitive habitat areas other than the MHPA are not significant. This mitigation measure needs to be upgraded to provide actual analysis considering realistic analysis of scattering, directivity, spreading, and attenuation, to compute what buffer is required as well as the mentioned conditions. It also need to consider all nearby sensitive areas whether they are in the MHPA or not.

STAFF RESPONSE #10: A horse wash down area would be provided to cool horses down after riding; it is not a grooming area for horses. Use of soap and shampoos would be prohibited. There would be signs at these areas that clearly state that cleansing products are not to be used at the site, and the park rangers would periodically monitor the area. All water from the wash down areas would be initially treated by the proposed grass swales on site.

STAFF RESPONSE #11: This area of the park does not have gravity access to a sewer system and the cost and maintenance of a private pump station is not within the project proposal. A septic system is the wastewater treatment method which the applicant would further pursue, and if the County Health Department approves the proposal, then the septic system would be provided based on their requirements. In addition, the MMRP requires that the design/placement of the septic leach fields be approved by EAS/MSCP to assure that the leach fields would not adversely effect adjoining and/or downstream biological resources.

The applicant Park and Recreation Department anticipates 20-50 users during the weekdays and 50-70 people during the weekends.

STAFF RESPONSE #12: The required manure removal mitigation measure for potential cowbird impacts, would also reduce increased introduction of invasive, non-native weeds. Also refer to previous Staff Responses #'s 5 and 6.

STAFF RESPONSE #13: The proposed lighting would be provided as a safety feature of the park, so that users can get to their car safely during the winter months. The lights would have shields, be low level and typically turned off one half hour after dusk. There will be occasional nighttime meetings or events at the park where lighting would be needed. Lighting would be consistent with the MSCP subarea plan recommendations on page 48, section 1.4.3.3. Also refer to previous Staff Response #4.

CUMULATIVE IMPACTS

The Mission Trails Campground is in the opposite side of Lake Kumeyaay. Between the two, wildlife access to the lake and the wildlife movement through this area is inappropriately limited. The Campground is also near Least Bell's Vireo habitat. The environmental document must identify the cumulative impact of the subject project in conjunction with other nearby developments on the vireos, on other sensitive species, the MHPA, wildlife movement, wildlife access to the nearby wetlands, and water quality. The document does not address the issue of cumulative impacts. 14

RELATIONSHIP TO MSCP

There is a presumption that the MSCP specifically allows this specific staging area. However the subarea plan only states: "Potential location of a future 30-40 acre equestrian center and buffer. This is a conceptual location only and may be adjusted in order to minimize disturbance to adjacent land uses and biological resources." The MND does not provide adequate information, analysis, or a adequate alternatives to show that the MSCP adjacency guidelines in terms of buffering, protection from invasive plants, water quality, and location are satisfied. 15

ADEQUACY OF THIS DOCUMENT

The potential impacts presented in this letter provide substantial evidence that support a fair argument that this project will result in a significant environmental effect, even with the mitigation measures as proposed. As such an EIR is required. We urge that the project be substantially reduced and modified to significantly reduce those impacts. If not we urge that an EIR be developed to adequately identify and reduce the impacts of this project. 16

In case of questions or follow-up, the undersigned can be reached at 619-224-4591 or peugh@home.com.

Respectfully,

James A. Peugh

James A. Peugh
Coastal and Wetlands Conservation Chair

-6-

5

STAFF RESPONSE #14: The major, limiting north-south wildlife movement barrier in the project vicinity is State Route 52. Currently there is no corridor immediately north of the project site; a drainage culvert under the freeway currently connects the site to Little Sycamore Canyon. The major wildlife corridor in the area connecting East Elliot MHPA area with Mission Trails is to the west of the project site. This corridor has been preserved with a freeway bridge over Spring Canyon. This corridor is 800 feet west of the project site and is shielded by an intervening knoll. The proposed development would not adversely effect this protected wildlife corridor. (See attached Figure 1.) Also refer to previous Staff Response #1.

STAFF RESPONSE #15: The commenter's assertion that it is presumptive to state that the MSCP specifically allows this project on this specific site is incorrect. The area has been specifically "white-holed" out of the MHPA in all relevant MSCP/MHPA maps. It should be noted that this area was further defined with this current analysis, as a 30-acre site. With this proposal, 12 acres would be developed and a net gain of 4.2 acres would be placed into the MHPA. Also see previous Staff Response #1.

STAFF RESPONSE #16: Comments noted. Refer to previous Staff Response #'s 1, 2, and 3.

California Native Plant Society

San Diego Chapter P.O. Box 121390 San Diego, CA 92112

September 28, 2001

Lawrence C. Monserrate
City of San Diego
Development Services Department
1222 First Street
San Diego, California 92101

Re: Mission Trails Park - Multi-use Staging Area Project, LDR No. 40-0524

Dear Mr. Monserrate:

17 The California Native Plant Society has reviewed the draft Mitigated Negative Declaration for the Mission Trails Park Multi-Use Staging Area Project and believe there is insufficient and/or inadequate information in this document to adequately examine the effects of this project on the natural resources in the area. We recommend the City reject this Mitigated Negative Declaration and prepare an Environmental Impact Report to fully examine the impacts of the project. We ask that the City consider the conflict of the proposed facility and its adjacency to a multi-million dollar Least Bell's vireo mitigation site and budgetary impacts of this project to the Park and Recreation Department.

18 Besides development, one of the leading causes in decline of Least Bell's vireo populations is cowbirds. Cowbirds are attracted to an area usually in association with stables or cows. Caltrans paid for a Least Bell's vireo mitigation which is located adjacent to the area proposed for this equestrian oriented facility. The facility will attract cowbirds causing the need for cowbird trapping in perpetuity. It is our experience that the Park and Recreation Department is always funding limited. Should the proposed facility be sited in the proposed area, a sufficient fund should be placed in an account to generate sufficient dollars for annual cowbird trapping that will be needed as a direct consequence of the City's actions. Cowbird trapping is currently conducted in the area but the Park and Recreation Department will need to ensure sufficient funds to continue such efforts.

19 Given that the Park and Recreation budget is usually less than needed for adequately managing parklands, we ask that the City reconsider the need for this facility. Wouldn't moneys be better spent hiring additional staff in parks where solo rangers are expected to enter riparian areas known to be supporting transients? The need for additional staff at San Diego and Otay River Parks come to mind if the City has extra funds to spend on staffing for parks.

What is the additional funding to be provided for increased vigilance at weed monitoring and eradication? Tire tread and hiking boots do contribute to the weed problem along trails but increasing horse usage has the potential to vastly increase the number of introductions of highly invasive weed species since there is no control on what or where the animals have been eating.

Dedicated to the preservation of California native flora

-7-

STAFF RESPONSE #17: Comments noted. Refer to previous Staff Response #'s 1, 2, and 3.

STAFF RESPONSE #18: As stated previously and determined in the distributed draft MND, impact of cowbirds attracted to the proposed equestrian activities and its resultant potential adverse effects on the endangered LBV's, were identified as significant. Specific mitigation measures are required. (See MMRP discussion.)

The applicant has stated that funding for the cowbird trapping would come from the general fund of the Park and Recreation Department. The cost of the actual plan would be provided during the production of the construction plans for the project and the actual cost of the cowbird trapping will be provided when the project is built and in use. Also refer to previous Staff Response #'s 5 and 6.

STAFF RESPONSE #19: Refer to previous Staff Response #'s 5, 6 and 18. It should be noted that trail usage within the MHPA was considered consistent with the City's MSCP Subarea Plan and that Mission Trails Park serves a multi-purpose including wildlife/habitat preserve and passive recreational uses.

The applicant has stated that the funding to design and construct within this City park is being provided largely by the Mission Trails Foundation, who has obtained Federal and State funds for the proposed project. The City of San Diego has a master agreement with the Foundation, where the Foundation can obtain Federal and State money, and once these fund are obtained, the Foundation would pay the City with this money to design and construct planned projects (including this proposed multi-use facility) within Mission Trails Park.

Marian Bear Natural Park had a few unusual plants that came up after hosting a petting zoo. This is especially critical as the riparian area is so close to the proposed facility. Are there limitations on the type of feed that can be brought into the park?

Specifically, with regards to San Diego ambrosia we have the following concerns:

20 (1) *Ambrosia pumila* (San Diego ambrosia) was proposed as endangered by the U.S. Fish and Wildlife Service on December 29, 1999 in the Federal Register (64 FR 72993). On August 29, 2001, the U.S. Fish and Wildlife Service announced that the U.S. Fish and Wildlife Service and several conservation organizations have reached an agreement in principle that will enable the Service to complete work on evaluations of numerous species proposed for listing under the Endangered Species Act. Under this agreement with the Center for Biological Diversity, Southern Appalachian Biodiversity Project, and the California Native Plant Society, the Service will issue final listing decisions for 14 species. Included in these 14 species is the final listing determination for San Diego ambrosia. The EIR should address this species as though it is a federally listed species.

21 (2) Translocation of San Diego ambrosia should be done in conjunction with native grassland restoration and that restoration efforts be expanded to include enhancement of sensitive species that co-occur with San Diego ambrosia, such as Variegated dudleya (*Dudleya variegata*), San Diego goldenstar (*Muilla clevelandii*), and Orcutt's brodiaea (*Brodiaea orcuttii*).This way, several sensitive species benefit from the protection and management of one species and the diversity of native grassland habitat is maintained. An active exotic plant species control program which focuses on the removal of non-native grasses from areas that support this species may be necessary to help stabilize these populations. As an attempt to relocate 3 shoots of San Diego ambrosia were unsuccessful in April 2001, we recommend that the if the site cannot be avoided, a minimum of five years of maintenance and monitoring shall be required at the San Diego ambrosia mitigation site. The mitigation requirement must consist of successfully transplanting 90 percent of the population or the City will continue with the mitigation until this requirement has been met.

I-8

22 The Biological Technical Report, by Helix Environmental Planning Inc., states that there are a series of road pools observed along the dirt road on the northern boundary of the Caltrans mitigation site with the "potential to support endangered San Diego fairy shrimp (*Branchinecta sandiegonensis*)." In Table 4 it states that the potential for occurrence is considered very low due to the lack of vernal pool habitat in the immediate vicinity and the recent man-made origination of the basins. However, as stated in the Final Determination of Critical Habitat for the San Diego fairy shrimp (*Branchinecta sandiegonensis*) of October 23, 2000, the San Diego fairy shrimp is a "habitat specialist found in small, shallow vernal pools and ephemeral (lasting a short time) basins that range in depth from approximately 5 to 30 centimeters (2 to 12 inches (in))." The depth of the pools are what is important not the origination of the basins. Also, based on survey dates provided in Appendix A, the biologists were not on the project site when these pools would have ponded and had the potential to support fairy shrimp. The pools should be surveyed for fairy shrimp in accordance with the U.S. Fish and Wildlife Service Interim Survey Guidelines for fairy shrimp.

Should you have any questions about our concerns, please do not hesitate to contact our Conservation Chair at (619) 421-5767.

Sincerely,

Cindy Burrascano

Cindy Burrascano
Chapter Conservation Chair

STAFF RESPONSE #20: Comments noted. It should also be noted that the San Diego ambrosia was fully evaluated as part of the MSCP and is a listed a covered MSCP narrow endemic species. Section 9.7 (b) of the City's MSCP Implementing Agreement (IA) addresses future listings, and specifically provides that where a covered species (e.g., Ambrosia pumilla) is not listed as of the effective date of the IA (i.e., July 1997), but is later listed, then the Section 10(a) Permit will become effective concurrent with the species listing as threatened or endangered.

As disclosed in the MMRP discussion of the distributed draft MND (and discussed in the attached biological survey report (page 22)), there was a mitigation measure for possible impacts to the potentially occurring three shouts of this sensitive, MSCP-covered plant species. The mitigation measure requires that prior to the start of site grading, a qualified biologist shall attempt to relocate the San Diego ambrosia *(Ambrosia pumila)* previously identified on the project site. If this sensitive plant is found on site, the plant shall be transplanted to an appropriate, protected site. (See MMRP discussion.)

STAFF RESPONSE #21: Comments noted. It should also be noted that if the ambrosia is not relocated prior to grading during the MMRP-required survey then there is no impact pursuant to CEQA which requires to be mitigated. In addition as previously stated, MSCP conditions of coverage allow 10% of the population in MTRP to be impacted; the subject three shoots of Ambrosia would be statistically insignificant. Also refer to previous Staff Response #20.

STAFF RSPONSE #22: Comments noted. It should be noted one of eight identified depressions would be impacted by the proposal. As stated in the Initial Study discussion and the attached biological survey report of the distributed draft MND, these "pools" contained no evidence of vernal pool or wetland vegetation; they were not City-defined wetlands. One of these "pools" is located in the area of impact. It was initially reported that these "pools" were mapped because of their potential for supporting the endangered San Diego fairy shrimp. Upon further discussion and clarifications, it was determined that it would be much more accurate to describe these "pools" as recent road ruts with very low potential for the endangered shrimp to occur. This determination was based on the fact that the access road on which they occur, was built approximately eight years ago when the Caltrans mitigation site was graded and the absence of vernal pool habitat in the immediate project vicinity. Nearest known vernal pools occur in the western portion of Mission Trials Regional Park near the County Water Authority pipeline corridor over 2 miles to the west.

DATE: September 13, 2001

TO: Larry Monserrate
Assistant Deputy Director
Development Services Department

FROM: Donald E. Steele
Member
Mission Trails Regional Park Foundation Board of Directors

SUBJECT: Comments to Draft MND
Mission Trails Regional Park Multi-Use Staging Area
No 40-0524

Page 2, V, 3: The San Diego Ambrosia discussed herein has already been transplanted. There is no San Diego Ambrosia on site. It would be advisable to have a qualified biologist re-inspect the site to ensure no other San Diego Ambrosia is present prior to grading. If found present, then it should be transplanted as prescribed. 23

Pages 2-3, V, 4-6: I concur in these statements and prescriptions. To that end, it is essential that the recommendations of the previous District Manager (Donald Steele) and Senior Park Ranger (Tracey Walker) be implemented. These included the hiring of a Grounds Maintenance Worker II (or Park Ranger Aide if created), the allocation of contractual services funding for cow bird trapping services, and the purchase of a quadrunner for the GMW II to access the area and trail system. Presently the quadrunner has been purchased. 24

Page 4-5, V, 12: The dates for the breeding season of the subject raptors are contrary to known facts. The December 1 date needs to be validated by qualified ornithologists and not justified by anecdotal or incidental uncorroborable reported sighting(s). 25

Page 5, V, 15: These statements and prescriptions are outside the scope of this project and are not applicable. This is a park management issue beyond the scope of this project and jurisdiction of Development Services staff. The section should be deleted. 26

-9-

STAFF RESPONSE #23: Comments noted. The required mitigation measure for the possible Ambrosia on site remains unchanged. Refer to previous Staff Responses #'s 20 and 21.

STAFF RESPONSE #24: Comments noted. Also refer to previous Staff Responses #'s 5 and 6.

STAFF RESPONSE #25: Based on input by the California Department of Fish and Game, the mitigation measure regarding avoidance of potential, significant impacts to any nesting raptor during the breeding season has been changed from December 1 to June 30 (in the distributed draft MND) to February 1 to August 15. (See following MMRP, Measure #12 and attached DFG e-mail.)

STAFF RESPONSE #26: It is acknowledged that equestrians currently use the existing trail system within the Mission Trails Park including areas known to contain LBV's. The proposed project would facilitate horse riders; however, the amount of equestrian use engendered by these proposed improvement is moot at best. For this CEQA impact analysis which attempts to address the adverse effects of not only the proposed facilities construction but the potential impacts of associated facilitated activities of the proposal, it was assumed that some increased use posed by the proposal would result in a potentially significant impact due to likely cowbird attraction. This is especially relevant within the park and the MHPA area with known endangered LBV's. Therefore, this cited mitigation measure (MMRP Measure #15) shall be required.

Padre Dam Municipal Water District

Every Drop Counts!

10887 Woodside Avenue / P.O. Box 719003
Santee, CA 92072-9003
Telephone: 619-448-3111
FAX Administration: 619-449-9469
FAX Operations: 619-449-9537
http://www.PadreDam.org
E-mail: Customer@Padre.org

September 25, 2001

City of San Diego
Development Services Department
Attn: Anne Lowry
1222 First Avenue, Mail Station 501
San Diego, CA 92101

SUBJECT: MISSION TRAILS REGIONAL PARK - MULTI-USE STAGING AREA PROJECT, SITE DEVELOPMENT PERMIT (LDR NO. 40-0524)

Thank you for the opportunity to review the Draft Mitigated Negative Declaration for the Mission Trails Regional Park, Multi-Use Staging Area Project.

27 In the project site location, it is noted that the site is approximately 300 yards east of the Mast Boulevard underpass of SR 52. Please review this as it appears that the site is west of Mast Boulevard.

This document makes no mention of the availability of water for the project and the fire protection requirements. The project has potential water main extensions which may have

28 possible environmental impacts. Please see the attached letter sent July 16, 2001, regarding this project and how water could be served.

If you have any questions, please contact me at (619) 258-4640.

PADRE DAM MUNICIPAL WATER DISTRICT

Courtney Mael
Engineering Technician / Plan Checker

CM:cc
Attachment

22708.1

-10-

STAFF RESPONSE #27: Comments noted.

STAFF RESPONSE #28: Water availability was an issue considered in the Initial Study Checklist for this proposal. As stated in the referenced letter (attached), water lines are on Mast Boulevard on the east side SR 52. Connection to this existing line can be achieved with installation of water pipelines with street right-of-way and would pose no adverse environmental effects. Typically, installation of pipelines within street ROW's is exemptable pursuant to CEQA.

THE CITY OF SAN DIEGO

July 12, 2001

Roland D. Rossmiller, P.E.
Director of Engineering
Padre Dam Municipal Water District
P.O. Box 719003
Santee, CA 92072

Dear Roland,

Re: Mission Trails Regional Park - Equestrian Staging Area

Thank you for meeting with Dorothy Leonard and Don Steele of the Mission Trails Foundation and myself on May 22, 2001 to discuss the water and sewer needs for the proposed Equestrian Staging project in Mission Trails Park. The following are items we discussed at the meeting:

1. Water Service - There is an existing 12" water line and a 6" reclaimed water line on Mast Blvd. on the east side of highway #52. There are three options of bringing water into the site:

Option 1 - City to install a water line from the point of connection to a new meter at the building that would serve the building and fire needs. This water line would be the property of Padre Dam Municipal Water District (PDMWD) and they would have an easement on park land for future maintenance of the line. This would be an 'Out-of-District Service' agreement and the water rates are double. Design and installation would require review and approval from the PDMWD. The initial costs are higher for this option because of PDMWD's involvement with design review and construction inspection, but the long term maintenance costs are lower. PDMWD normal capacity fees noted below would also apply.

Option 2 - PDMWD to install large meter (at City's cost) capable of providing fire flows, at the point of connection at Mast Blvd. City of San Diego to install a water main to the equestrian center. This water line is the property of the City of San Diego to maintain. In this case the water would be sold from PDMWD to the City's Water Department and then the City's Water Department would sell the water to Park and Recreation. This agreement would require a more complex service agreement between the City and PDMWD. This would not require PDMWD plan or installation review or approval for the water line installation. Double water rates and normal capacity fee noted below would also apply.

Option 3 - PDMWD to install a meter (at City's cost) at the point of connection and the City will install a Reduced Pressure Backflow device and then install two private water lines, one for building and the other for fire needs. These two private lines would run under the public street

Northern Parks Division
Park and Recreation • Community and Neighborhood Services • Balboa Park • San Diego, CA 92101
Tel (619) 525-8222 Fax (619) 525-8224
Mailing Address: 202 C Street, MS 35 • San Diego, CA 92101-3860

and would be the property of the City to maintain. The long term maintenance will be the City's Water Department's responsibility and this option could allow others to tap into the private un-metered fire service line in the future without knowing. This arrangement could be done either as an Out-of-District Service Agreement directly with the Park and Recreation Department, or by the more complex service agreement between the City and PDMWD.

We determined that the building service line would have approximately $5600 capacity charge for 2edu and initial start up costs, these numbers will be verified by PDMWD at time of payment. The irrigation service line would have approximately $23,000 capacity charge for eight edu and initial start up costs, these numbers will be verified by PDMWD at time of peyment. The irrigation rate could be reduced the second year if the usage was significantly lower then what was estimated. In addition, if we use reclaimed water for the irrigation needs then we could get a 15% discount on the monthly water consumption rates.

2. Sewer - The existing sewer line is quite a distance from the project site and it is located at an elevation of 360'. The project site is approximately 20' below the existing sewer line and therefore this would require a small sewer pump station to be built at the project site. A small pump station can cost approximately $150,000 to build in addition to the yearly maintenance cost of the pump. The ownership, cost to install and maintenance of this pump unit is borne by the City. PDMWD suggests that we look into a septic system.

3. Fire Service - We will need to verify with the City's Fire Department on the fire flow requirement for this project. Also verify whether the City of San Diego, or the City of Santee will be the first responder in the case of an emergency.

Once the above items are resolved by the City Departments and the Mission Trails Foundation, PDMWD will prepare a draft water service agreement for review and comment. This agreement will then be taken to the PDMWD board and the City Council of San Diego for final approval. Please sign the bottom of this letter to confirm that these items are your understanding of what was discussed at the meeting and fax this to me at 619-525-8224. Thank you.

Sincerely,

Robin Shifflet, Park Planner
Park and Recreation Department

7/16/01
Roland D. Rossmiller, P.E.
Padre Dam Municipal Water District

RS/rs

cc: Dorothy Leonard, Mission Trails Foundation
Juan Ballgad, Development Services Department

CITY OF SANTEE

September 20, 2001

City of San Diego Planning Department
Attn: John Kovac
202 'C' Street, M.S. 4A
San Diego, CA 92101

Re: Mitigated Negative Declaration for the Mission Trails Regional Park Equestrian Center

Dear Mr. Kovac:

The City has reviewed the Mitigated Negative Declaration that was prepared for the planned equestrian center in Mission Trails Regional Park. The planned facility will be in the eastern end of the park, just east of the Santee city boundary.

29 Based on the information in the document and discussions with yourself and other San Diego staff members, we understand that the current plans do not involve permanent boarding of horses at the site and that rentals of horses will be done only on a periodic basis.

30 Given the proximity of the facility to existing homes in the western end of the City, we would be concerned with any changes in the operation of the facility which would result in horses being boarded on a permanent or semi-permanent basis. We believe that permanent or semi-permanent boarding would have greater potential to create perceivable odors to existing residences.

31 Should permanent or semi-permanent boarding be considered in the future, we believe additional environmental review would be appropriate, including adoption of mitigation measures as needed to address possible odor impacts to Santee residents.

32 We appreciate the opportunity to review the environmental document and would appreciate being kept apprised on the progress of the project. We believe the overall project will be a very positive addition to the park which will benefit not only equestrian users, but everyone that currently enjoys the park.

Sincerely,

Todd Galarneau
Senior Planner

10601 Magnolia Avenue • Santee, California 92071-1266 • (619) 258-4100 • www.ci.santee.ca.us

-112-

STAFF RESPONSE #29: The commenter's understanding is correct; there would be no permanent boarding of horses on site. In addition, possible future, horse rental concessionaire is not covered by this analysis and may require further CEQA review if proposed.

STAFF RESPONSE #30: If permanent or semi-permanent horse boarding is proposed in the future on project site, especially, if it is connected with a commercial operation which may require a discretionary permit and/or approval, additional CEQA review would be required. Potential odor impacts on residential receptors would be considered. The applicant has stated that occassional over night boarding of horses may occur on site associated with special events; this intermittant occurance would not cause any adverse effects.

STAFF RESPONSE #31: The commenter's understanding is essentially correct. Also refer to previous Staff Response #30.

STAFF RESPONSE #32: Comments duly noted.

UNITED STATES MARINE CORPS
MARINE CORPS AIR BASES WESTERN AREA MIRAMAR
P.O. BOX 452001
SAN DIEGO, CA 92145-2001

11103.34A
AQ/40-0524
September 20, 2001

CITY OF SAN DIEGO
PLANNING AND DEVELOPMENT REVIEW
ATTN LAWRENCE MONSERRATE
1222 FIRST AVENUE MS 302
SAN DIEGO CA 92101

RE: MISSION TRAILS REGIONAL PARK; PUBLIC NOTICE OF A DRAFT MITIGATED NEGATIVE DECLARATION FOR THE MISSION TRAILS REGIONAL PARK MULTI-USE STAGING AREA PROJECT, LDR NO. 40-0524

Dear Mr. Monserrate,

This is in response to the Public Notice of a Draft Mitigated Negative Declaration, which addresses a multi-use staging area within the Mission Trails Regional Park Planning area.

-13-

33 The proposed site will be affected by operations of military fixed and rotary-wing aircraft transiting to and from Marine Corps Air Station (MCAS) Miramar. The project is located outside the adopted and projected 60-65 dB Community Noise Equivalent Level (CNEL) noise contour and is consistent with the land use compatibility guidelines for Miramar operations. However, the location is affected by the down wind landing pattern and Field Carrier Landing Practice (FCLP) Flight Corridors for fixed-wing operations. In addition, this location is affected by the FCLP and Yuma Flight Corridors for helicopter operations. Park visitors will both see and hear military aircraft and experience varying degrees of noise and vibration. Consequently, we are recommending full disclosure of noise and visual impacts to all users of this facility.

STAFF RESPONSE #33: Comments noted.

34 Due to the proximity of staging facilities to Miramar Flight Corridors, we recommend that all conceptual areas be examined within the cumulative impact analysis. Liaison with the Padre Dam Municipal Water District has established that conceptual sites on their property may also include stabling accommodations within this recreational facility complex.

STAFF RESPONSE #34: Comments noted.

Normal hours of operation at MCAS Miramar are as follows:

Monday through Thursday	7:00 a.m. to 12:00 midnight
Friday	7:00 a.m. to 6:00 p.m.
Saturday, Sunday, Holidays	8:00 a.m. to 6:00 p.m.

35 MCAS Miramar is a master air station, and as such, can operate 24 hours per day, 7 days per week. Fiscal and manpower constraints, as well as efforts to reduce the noise impact of our operations on the surrounding community, impose the above hours of operation. Circumstances frequently arise which require an extension of these operating hours.

Thank you for the opportunity to review this land use proposal. If we may be of any further assistance, please contact Ms. Rhonda Benally at (858)577-6603.

Sincerely,

G. L. GOODMAN
Colonel, U.S. Marine Corps
Assistant Chief of Staff
Community Plans and Liaison

STAFF RESPONSE #35: Comments noted.

San Diego County Archaeological Society

Environmental Review Committee

19 September 2001

To: Mr. John Kovac
Land Development Review Division
Planning and Development Review Department
City of San Diego
1222 First Avenue, Mail Station 501
San Diego, California 92101

Subject: Proposed Mitigated Negative Declaration
Mission Trails Regional Park – Multi-use Staging Area Project
LDR No. 40-0524

Dear Mr. Kovac:

I have reviewed the subject PMND on behalf of this committee of the San Diego County Archaeological Society.

36 Based on the information contained in the PMND and initial study, and the report and letter report from Affinis, we agree with the impact analysis and mitigation measures as presented.

SDCAS appreciates being provided this opportunity to review and comment upon this project's environmental documents.

Sincerely,

James W. Royle, Jr., Chairperson
Environmental Review Committee

cc: Affinis
SDCAS President
File

P.O. Box 81106 . San Diego, CA 92138-1106 . (619) 538-0935

-15-

STAFF RESPONSE #36: Comments duly noted.

Mission Trails Regional Park
Citizens' Advisory Committee
One Father Junipero Serra Trail
San Diego, California 92119

September 18, 2001

Lawrence C. Monserrate
Assistant Deputy Director
Development Services Department
City of San Diego
1222 First Avenue, MS 501
San Diego, CA 92101

RE: Draft MND for MTRP Multi-Use Staging Area Project

Dear Mr. Monserrate:

37 As chair of the Mission Trails Regional Park Citizens' Advisory Committee (MTRP-CAC), I am writing in response to the Draft Mitigated Negative Declaration (DMND) for the proposed MTRP Multi-Use Staging Area. Representatives of the MTRP-CAC question the accuracy of the information included in mitigation recommendation number 12. This item, which proposes mitigation for white-tailed kites and red-shouldered hawks, states that the raptors breeding season is December 1 to June 30, and that this season shall be avoided unless a survey is conducted by a qualified biologist to confirm that no nesting raptors are located within 500 feet of the construction/grading area.

38 We are aware that the Biological Technical Report prepared by Helix Environmental Planning, Inc. states that the breeding season for raptors is December 1 to June 30. We have questioned these dates for several months and have recently obtained information from the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG) that indicates the Helix report is incorrect. Attached is a memo from Walter R. Odening, Ph.D., CSE, a member of the Mission Trails Regional Park Citizens' Advisory Committee, indicating that the nesting season for white-tailed kites and red-shouldered hawks is from mid- to late-February through late July and early August. In addition, Dr. Odening believes there is no need under the Migratory Bird Treaty Act (MBTA) to mitigate for construction noise. Based on the information from USFWS and CDFG which is contained in the attached memo from Dr. Odening, a respected Certified Senior Ecologist (CSE), we request that the proposed mitigation for white-tailed kites and red-shouldered hawks not be included in the final MND.

Sincerely,

Dorothy Leonard

Dorothy Leonard, Chair
Mission Trails Regional Park
Citizens' Advisory Committee

Enclosure (1)

cc: Councilmember Jim Madaffer, Chair, MTRP Task Force
Mayor Dick Murphy, Member, MTRP Task Force
Anne Lowry, Senior Environmental Planner
Robin Shifflet, Project Manager, Park & Recreation Department

STAFF RESPONSE #37: Comments noted. Also refer to previous Staff Response# 25.

STAFF RESPONSE #38: Refer to previous Staff Response# 25. In addition, all raptors are sensitive species. Raptors such as the bald eagle, northern harrier, Cooper's hawk, Swainson's hawk, ferruginous hawk, golden eagle, and peregrine falcon are MSCP-covered species. While the commenter's cited federal law may not require mitigation, CEQA and more specifically, City's procedures for implementing CEQA requires impacts to any nesting raptors to be avoided, reduced, or mitigated.

ATTACHMENT TO LEONARD/CAC COMMENT LETTER

September 17, 2001

To: Dorothy Leonard

From: Walter R.Odening, Ph.D., CSE

Subject: Raptor Mitigation for the Construction of the Equestrian/Multipurpose Staging Area at Mast Boulevard.

Dorothy:

As a result of my concern that the Mitigated Negative Declaration prepared for the Equestrian Staging Area requires a mitigation of no noise impacts to nesting raptors, with the nesting season starting on December 1, I contacted several agency and consultant experts on birds, including raptors. These individuals included two USFWS staff (Mark Pavelka and Bill Ostheimer), one CDFG staff (David Mayer), an independent raptor expert (Peter Bloom) whose name was provided by Mark Pavelka, and some other professional consultants with expertise in raptor biology.

In my discussions with Mark Pavelka he agreed with my stated opinion that raptor breeding starts in early to mid-February and ends in late July. He also indicated that some territoriality, nest site selection, and courtship may occur earlier, but that December 1 was a little early to be putting on restrictions. He suggested that I talk with Peter Bloom.

Peter Bloom said he basically agreed with the February to July season. He did say that the white-trailed kite might nest longer because the species will often have more than one brood. He also said that some species such as the barn owl may nest and have broods year around. He also thought pushing the breeding season to December 1 was a little conservative.

I then had a discussion with Bill Ostheimer of the USFWS and he sent me some information that also indicated raptor nesting season was from February to the end of July and occasionally to mid-August.

From *Birds of San Diego County* by Phil Unitt

White-tailed Kite: Birds seen on nests as early as February 19. Usual March 1 - May 28.

Red Shouldered Hawk: Egg dates February 28 - May 13.

Red-tailed Hawk: 22 February - 15 April.

From Birds *of North America* (No. 52, 1993) there is a reference to a nest in early February for a white-tailed kite in San Diego County. Most of the hatched birds would be fledged and independent by the end of July - mid-August.

Bill indicated that other sources he looked at did not extend any of the dates too much.

I also spoke to David Mayer of the CDFG and he basically agreed that except for the occasional barn or great horned owl, raptors nest from early to mid-February to July - early August. He also indicated that, if there were no palm trees or abandoned buildings in the area, owls probably would not be nesting there. He also stated that the December 1 date was earlier than he had seen, even when owls were nesting.

I also spoke with three individuals who are consulting biologists and work with endangered species and raptors as part of base line studies and mitigation monitoring. They all agreed that in general raptors start nesting in early to mid-February with fledging and abandoning of nests occurring in mid- to late-August.

In addition, I looked into the requirements for protection of raptors under the Migratory Bird Treaty Act (MBTA). Under that Act it is unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase or barter any migratory bird, including the feathers or other parts, nest, eggs, or migratory bird products. Amendments to the Act require measures to protect identified ecosystems of special importance to migratory birds from pollution, detrimental alterations and other environmental degradations.

I am not a lawyer, but my experience is such that it is my opinion that if construction activity during the nesting season involved removal of trees, shrubs or other habitat containing active nests such an action would be illegal, but if such habitat was removed without destroying an active nest it would not be illegal. Also it is my opinion that since there is no "harassment" language leading to a take in the MBTA, as there is in the Endangered Species Act (ESA), that noise, even during nesting periods, would not technically require mitigation as has been required under the ESA.

Since the proposed action of building a new staging area will not require the removal of any of the riparian trees, and we will have a buffer of several hundred feet from the riparian area on the west and the Caltrans mitigation area to the south, there should be no mitigation requirement for raptors in the Mitigated Negative Declaration (MND). This is especially true for the nesting season restriction (December 1) for the two raptor species called out in the MND, white-tailed kite and red shouldered hawk, since they are known to nest during the mid- to late-February through late July and early August.

I hope this brief memo will be of help in negotiating away the restrictions on the construction timing. If you need more information I will be glad to try and provide it.

Walter Odening

-17-

US Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
2730 Loker Avenue West
Carlsbad, CA 92008
(760) 431-9440
FAX (760) 431-9624

CA Dept. of Fish & Game
South Coast Regional Office
4949 Viewridge Avenue
San Diego, CA 92123
(858) 467-4201
FAX (858) 467-4299

In Reply Refer to: FWS-SDG-2042.1; SCH2001091006

OCT 03 2001

Mr. Lawrence Monserrate
City of San Diego
Planning and Development Review
Land Development Review Division
1222 First Avenue, Mail Station 501
San Diego, California 92101

Attn: John Kovac

Re: Comments on the Mitigated Negative Declaration for the Mission Trails Regional Park - Multi-Use Staging Area Project in the City of San Diego, California

Dear Mr. Monserrate:

39 The U.S. Fish and Wildlife Service (Service) and the California Department of Fish and Game (Department), hereafter, referred to as the Wildlife Agencies, have received and reviewed the Mitigated Negative Declaration (MND), the Initial Study, and the Biological Report (Helix 2001) for the above-referenced project. The project is located in the northeast corner of the City of San Diego's (City) Mission Trails Regional Park within San Diego County (County). The site is bounded by SR-52 to the north, the drainage out of Little Sycamore Canyon to the west, and the Caltrans mitigation site to the south. All of the area is within the City's Multiple Species Conservation Program (MSCP) and a portion of the project is within the Multiple Habitat Planning Area (MHPA) preserve.

STAFF RESPONSE #39: Comments noted.

40 The primary concern and mandate of the Service is the protection of public fish and wildlife resources and their habitats. The Service has legal responsibility for the welfare of migratory birds, anadromous fish, and endangered animals and plants occurring in the United States. The Service is also responsible for administering the Endangered Species Act of 1973, as amended. The Department is a Trustee Agency and a Responsible Agency pursuant to the California Environmental Quality Act, Sections 15386 and 15381 respectively. The Department is responsible for the conservation, protection, and management of the state's biological resources, including rare, threatened, and endangered plant and animal species, pursuant to the California Endangered Species Act and administers the Natural Community Conservation Planning Program.

STAFF RESPONSE #40: Comments noted.

The project is proposing to develop 11.77 acres for a multi-use staging area to improve access to the City's Mission Trails Regional Park for equestrians, hikers, and bicyclists. The project

consists of a 5,000 square-foot main structure to house maintenance facilities, park ranger offices, a conference room, display room with an information desk, park staff restroom, garage, group kitchen, public restrooms, storage room, a covered group picnic shelter on the west side, and a screened storage yard on the east side. There will be a separate service building with restrooms, a 15-space parking lot for horse trailers, a 49-space parking lot for other vehicles, horse corrals, two multi-purpose rings, open BBQ area, picnic tables, horse manure storage bins, minimal security lighting, and internal loop access road.

41 Vegetation impacts that will result from the project are 0.67 acre of coastal sage scrub, 0.41 acre of broom baccharis scrub, and 10.0 acres of non-native grassland. A boundary adjustment has been proposed for the project to remove 2.2 acres of NNG from the MHPA and add 6.46 acres of land into the MHPA. The 6.46 acres to be added to the MHPA consists of 2.62 acres of broom baccharis scrub, 2 acres of CSS, 1.3 acres of NNG, 0.04 acre of mule fat scrub, 0.16 acre of juncus meadow, 0.30 acre of disturbed area, and a 0.04 acre disturbed basin. Approximately 6.08 acres of the 6.46 acres being added into the MHPA will serve as mitigation for impacts associated with the project.

San Diego Ambrosia

42 San Diego ambrosia (*Ambrosia pumila*) was federally proposed endangered on December 29, 1999 (64 FR 72993) and it is covered under the MSCP as a Narrow Endemic species. San Diego ambrosia is subject to ongoing threats from urbanization, recreational development, and highway construction and modification. San Diego ambrosia is a herbaceous perennial herb with finely lobed leaves that are grayish in color. Leaves are divided into many small segments and are covered with short, soft, grey-white hairs. Aerial stems arise from a branched system of rhizome-like roots. This results in groupings of aerial stems that are, or at one time were, attached to one another. The grouping of stems is often referred to as clones. Because this species is rhizomatous, it may produce a few to many aerial stems each year and although the rhizomes may become separated over time, the individual aerial stems remain genetically identical. Due to this fact, it is possible for an occurrence to support thousands of aerial stems, yet consist of very few genetically different individuals. The San Diego ambrosia located in Mission Trails Regional Park is the second largest occurrence in the United States. The largest being on the San Diego National Wildlife Refuge. Table 3-5 of the City's Subarea Plan states that only 10% of the population of the Mission Trails Regional Park population can be impacted. If more than 10% of the population is impacted, San Diego ambrosia will no longer be a covered species under MSCP. Due to the biology of the species it is difficult to determine exactly what would constitute 10% of the population. It is imperative for the survival and recovery of the species to maintain as much genetic diversity as possible.

43 The Wildlife Agencies are concerned that no focused protocol level surveys were performed for San Diego ambrosia. Attachment 1, Table 1 of the Guidelines for Conducting Biological Surveys states that inside and outside of the MHPA, focused surveys are required for narrow endemic species. Focused surveys should be done this upcoming season (May-October) to adequately quantify the loss of San Diego ambrosia from this project.

44 In addition, the Biological Technical Report states that a general biological survey and a rare plant survey were completed on May 21, 1999. An additional vegetation map survey was performed on April 9, 2001. The Biological Technical Report does not indicate or mention any

STAFF RESPONSE #41: Comments noted.

STAFF RESPONSE #42: Comments noted. As stated previously and in the distributed MND, the applicant would be required (by the MMRP; Measure #3) to hire a qualified biologist to survey the project site prior to grading to attempt to relocate the three shouts of the ambrosia reported by the park rangers. Also, refer to previous Staff Responses #'s 20 and 21.

STAFF RESPONSE #43: The MMRP has been revised to clearly state that the required focused survey shall be performed for the San Diego ambrosia during the season where this narrow-endemics is most likely to be detected if still present (May, June, or July).

STAFF RESPONSE #44: The applicant's biological consultant did indeed survey for the ambrosia during the cited April, 2001 additional survey.

rare plant surveys for San Diego ambrosia after the 2000 sighting of San Diego ambrosia by a Park Ranger and later confirmed by Dudek & Associates.

45 Page 2 of the MND states that prior to grading, efforts will be made to locate the previously identified population and if found, it would be transplanted. However, the MND leaves the option of no mitigation for San Diego ambrosia if it is not found despite past observations on-site. Any efforts to locate San Diego ambrosia prior to construction should be done at the appropriate time of year. The City should mitigate for the San Diego ambrosia that was documented within the project's footprint in the City of San Diego Mission Trails Regional Park: San Diego ambrosia Management Plan, May 15, 2000, whether it is found in pre-construction surveys or not. Any occurrences located within the project footprint should count toward the 10% of the population allowed to be impacted under the MSCP and this should be quantified. The Wildlife Agencies would like to review any transplantation and monitoring plans proposed for San Diego ambrosia. We are available to assist the City in developing a plan.

Additional Wildlife Agencies comments and recommendations:

1. 46 We recommend that cowbird trapping be done in perpetuity for this project due to the nature of the project and adjacent sensitive resources. Page 3 of the MND states that the City Parks and Recreation Department will develop and implement a cowbird trapping program to remove any cowbirds attracted to the project site or the adjacent Caltran's mitigation site; however, it does not give any indication of the duration of the trapping.

47 The cowbird management plan should be submitted to the Wildlife Agencies for review prior to construction. The plan should outline where the traps will be set, who will be doing the trapping, how often they will be checked, what time of the season trapping will begin and end, adaptive management strategies to ensure that the plan is working as desired, and reporting requirements of the plan. The plan should take into consideration that horse manure could be spread considerable distance from the proposed facility and could attract cowbirds. The Wildlife Agencies are available to work with the City to develop a cowbird trapping program.

2. 48 Page 48 of the City's Subarea Plan sets out the adjacency guidelines for development adjacent to the MHPA. This project has the potential to impact the MHPA by the addition of drainage into the preserve. In addition, the facility has the possibility to allow for the introduction of invasive plant species into the MHPA due to increased recreational uses. Horses boarded in other areas of the City or County would have open access to the MHPA and may bring in weeds from those areas. This combined with a potential increase in use of the park by bikers and hikers could lead to an increase of invasive species in the MHPA. We recommend that concurrent with the manure control program, non-native plant species control be required within the staging area and trails.

3. 49 The disturbed basin (DB) mapped in Figures 4 and 8 of the Biological Technical Report, that is included in the area being added to the MHPA, should be updated to reflect the southern willow scrub observed in the basin during a September 20, 2001, site visit with the City.

4. Page 5 and 6 of the Initial Study identifies the nearest municipal sewer connection to the

-20-

STAFF RESPONSE #45: Refer to previous Staff Responses #'s 20, 21, and 43.

STAFF RESPONSE #46: Comments noted. The MMRP, Measure #5 has been revised to state that the cowbird trapping program shall be implemented as long as the proposed multi-use staging area accommodates equestrian uses. Also refer to previous Staff Response #6.

STAFF RESPONSE #47: Comments noted. The MMRP, Measure #5 has been revised to state that the cowbird plan be submitted to the California Department of Fish and Game and US Fish and Wildlife Service prior to construction.

STAFF RESPONSE #48: Refer to previous Staff Responses #'s 6, 9, 12, and 19.

STAFF RESPONSE #49: The commenter is correct. The City agrees that this 0.04 acre "disturbed basin" as described in the cited report, is better classified as an emerging southern willow scrub wetland. However, it should be pointed out that this wetland is not in the area of impact; it is in the area to be used for mitigation and placed into the MHPA. In addition, it may require better management by the applicant during the course of implementing their naural resources management plan, to assure that this potentially sensitive habitat be protected through signage and/or barriers to allow this emerging habitat to continue to mature and improve in its potential wildlife value. It should be noted that during the cited fall, field check, small patches of this basin appeared still moist and the basin contained emerging willow shouts.

50 proposed facility; however, it states that due to cost, the City Park and Recreation Department wants to use a septic system for wastewater. None of the environmental documents for this project address potential impacts that could occur from the use of a septic system. We recommend that the City seriously reconsider disposing of wastewater via sewer, given the sensitive location of the project and the proximity to significant wetlands.

We appreciate the opportunity to comment on this MND. If you have any questions, please contact Josh Garcia of the Service at (760) 431-9440 or David Mayer of the Department at (858) 467-4234.

Sincerely,

FOR Nancy Gilbert
Assistant Field Director
Carlsbad Fish and Wildlife Office
U.S. Fish and Wildlife Service

William E. Tippets
Environmental Program Manager
South Coast Region
California Department of Fish and Game

Literature Cited

Dudek & Associates, Inc. 2000. City of San Diego Mission Trails Regional Park: San Diego Ambrosia Management Plan. City of San Diego. May 2000

City of San Diego. 1999. City of San Diego; Land Development Codes, Biology Guidelines. January 2000

City of San Diego. 1997. Multiple Species Conservation Program; City of San Diego Subarea Plan. March 1997

U.S. Fish and Wildlife Service. 1999. Endangered and threatened wildlife and plants; Proposed Endangered Status for *Ambrosia pumila* (San Diego Ambrosia) from Southern California; Proposed Rule. Federal Register 64: 72993-73002

STAFF RESPONSE #50: During the initial study investigation, it was found that USDA soil survey generally, the soil on the project site is suitable for a septic system; the site has suitable soil permeability to adequately percolate waste water from a leach field. In order to use a septic system, the applicant must obtain an approval from the County Health Department which will determine the required size and location of the leach field. If the County does not approve a septic system for this proposed use and/or location, a hookup to public sewer. (See Item #2 of the attached letter to Padre Dam MWD comment letter.) In addition, the MMRP requires that the design/placement of the septic leach fields be approved by EAS/MSCP to assure that the leach fields would not adversely effect adjoining and/or downstream biological resources. Also refer to previous Staff Response #11.

From: "David Mayer" <DMayer@dfg.ca.gov>
To: <R4R@sdcity.sannet.gov>
Date: Friday, August 17, 2001 2:56PM
Subject: Re: Raptor Breeding Season

Randy,

Several of us had a conversation on this topic a couple weeks ago. I wish I had a simple answer, so if you want a fast answer skip to the last paragraph. The best answer is from Feb 1 through mid August. In most cases, you would expect that a raptor nest would have fledged (and have young which can fly reasonably well, though would not necessarily be independent of the parents) by the end of July. Species such as Cooper's hawk or American kestrel may start a bit later and take until early/mid August. Most passerines have also usually fledged by the end of July. There are some rare occurrences of late nesting, which is why the gnatcatcher nesting period was extended to the end of August.

On the front end of the season, March/April/May is most common, but February is not too uncommon. So, to protect raptors that have set up a territory and are about to lay eggs, we use February 1 as the start of the season. Sometimes owls (great horned owls, barn owls, etc) start in January or even December, so a biologist should check before construction begins if there is any potential for owls. Also, both non-native trees (eucs, pepper, etc) and the more typical native trees, as well as rock outcrop or cliff habitat, can all support nesting by some raptor species. I have been told that Cooper's hawks even use large lemonade-berry or sumac in some areas.

Okay, so to sum up this long-winded response: Feb 1 through July 31 is most likely sufficient, but there may be a need to delay until mid August in some circumstances. Owls may begin nesting as early as late December or January.

Dave Mayer
California Department of Fish & Game
South Coast Region
4949 Viewridge Avenue
San Diego, CA 92123
858-467-4234 (phone)
858-467-4299 (fax)
dmayer@dfg.ca.gov

>>> "Randy Rodriguez" <R4R@sdcity.sannet.gov> 08/16/01 04:24PM >>>
Hi David:

Do you know what DFG defines as the raptor breeding season in San Diego County? It's my understanding that December to June is the typically considered the raptor breeding season to capture all potential raptor species (including incidental winter breeding). The question relates to grading restrictions if an active nest is detected on-site. I would appreciate any insight you may have. Hope all is well. Thanks.

Randy

City of San Diego
Development Services Department
LAND DEVELOPMENT REVIEW
1222 First Avenue, Mail Station 501
San Diego, CA 92101
(619) 446-5460

INITIAL STUDY
LDR No. 40-0524

SUBJECT: Mission Trails Regional Park - Multi-Use Staging Area Project: APPROVAL of a SITE DEVELOPMENT PERMIT (LDR No.40-0524) to allow the development of a twelve-acre, multi-use staging area to improve access to the City's Mission Trails Regional Park by horse riders, hikers, and bicyclists to the existing park trail system. The proposed improvements include a 5,000-square-foot, main structure containing park maintenance facility, park ranger offices, conference room, display room with information counter, park staff restroom with shower, garage, group kitchen, public restrooms, and storage room, a 2,300 s.f. covered group picnic shelter attached to the west side, and a screened storage yard attached to the east side. There would be a separate, 425 s.f service building containing public restrooms, 15-space parking lot for horse trailers, 49-space parking lot for other vehicles, horse corrals, two multi-purpose rings, open BBQ area, picnic tables, horse manure storage bins, minimal security lighting, and internal loop access road. The maximum height of the main structure would be 26 feet, 10 inches; the height of the roof over the group picnic area would be a maximum of 18 feet, 9 inches. The project site is located in the northeastern portion of Mission Trails Regional Park about 300 yards east of the Mast Boulevard underpass of SR 52. The site is bounded by the right-of-way of SR 52 to the north, the drainage out of Little Sycamore Canyon to the west, and a Caltrans mitigation site and the San Diego River to the south.
Applicant: City of San Diego, Park and Recreation Department

I. PURPOSE AND MAIN FEATURES:

Background

The project site is a portion of the 30-acre site which was not placed within the Multi-Habitat Planning Area (MHPA), the City's planned wildlife preserve which would implement the adopted Multiple Species Conservation Program (MSCP). This exclusion is stated in the 1997 MSCP Subarea Plan. In addition, passive recreational uses such as use of trails within the MHPA is also consistent with the Subarea Plan.

The development of Mission Trails Regional Park, the implementation of the park plan, began with the construction of the Visitors Center (EIR No.90-0980; dated September 8, 1992) and continued with the installation of the western park trails staging area at the eastern terminus of Clairemont Mesa Boulevard (MND No. 95-0638; dated November 11, 1996). In addition, there have been improvements at the Old Mission Dam area (ND

No. 96-0269; dated July 5, 1996). The current proposal, the subject of this document, would complete the staging area for the northern portion of the park.

Project Description

The proposed project is the development of a twelve-acre, multi-use staging area to allow access of the City's Mission Trails Regional Park by horse riders, hikers, and bicyclists. The proposal would facilitate access to the existing park trail system from the northern portion of the park. (See attached Figures 1, 2, and 4.) The proposed improvements include a 5,000 square feet, main structure northwestern portion of the project site, containing park maintenance facility, park ranger offices, conference room, display room with information counter, park staff restroom with shower, garage, group kitchen, public restrooms, and storage room, a 2,300 s.f. covered group picnic shelter attached to the west side, and a screened storage yard for park maintenance attached to the east side. The maximum height of the main structure would be 26 feet, 10 inches; the height of the roof over the group picnic area would be a maximum of 18 feet, 9 inches. There would be a separate, 425 s.f service building in the central portion of the site, containing public restrooms. Other proposed improvements include a 15-space parking lot for horse trailers, 49-space parking lot for other vehicles, horse corrals, two multi-purpose rings, open BBQ area, picnic tables, horse manure storage bins, minimal security lighting, and an internal loop access road. The entrance at the terminus of Mast Boulevard, would contain a locked gate such that the closed facility would be secured at night. An ADA accessible walkway would extend from the entrance at Mast Boulevard to the main facility building on the northwestern portion of the site.

All runoff from the project site would be routed to five detention basins spread throughout the site with two large, linear basins serving the parking lots, equestrian rings, and horse corral area. (See attached Figures 4 and 6.) Treated flows from these basins would be directed to a dissipating, rip-rapped outlets before flowing southwards towards the river.

Environmental Setting

The 12-acre, project site is located in the northeastern portion of Mission Trails Regional Park about 300 yards east of the Mast Boulevard underpass of SR 52. The site is bounded by the right-of-way of SR 52 to the north, the drainage out of Little Sycamore Canyon to the west, and a Caltrans mitigation site and the San Diego River to the south. Much of the currently undeveloped site contains non-native grasslands with patches of native vegetation. (See attached Figure 3.) The project would impact one acre of coastal sage scrub and broom baccharis scrub. The project site is a portion of the 30 acre site which was not placed within the Multi-Habitat Planning Area (MHPA), the City's planned wildlife preserve which would implement the adopted Multiple Species Conservation Program (MSCP).

The project site is flanked on the west by a drainage which flows from Little Sycamore Canyon under SR 52 through a culvert, drains the western portion of the project site, and

eventually flows into the San Diego River. Near or parallel to this drainage are scattered sycamores and patches of mulefat scrub and juncus meadow. The proposed improvements are located outside the 100-year floodplain of this drainage and would not adversely effect the sensitive native vegetation associated with the drainage. No improvements are proposed to the existing trail crossing of this drainage.

Immediately to the south of the project site, across an existing SDG&E dirt access road, is the Caltrans mitigation site for impacts from the construction of SR 52. This area has been graded down towards the river level approximately eight years ago and is currently covered predominately by previously planted cottonwoods. A manufactured slope separates the project site from the mitigation site. The San Diego River flows further south approximately one-quarter mile south of the project site.

The majority of the site slopes gently to the south southeast. The project site drops in elevation from 350 feet MSL along its northern boundary to 310 feet MSL along the southern access road. A drop of 40 feet over a distance of over 500 feet occurs across the site with a 20-foot drop occurring along the 160-feet-wide, northern portion. This northern sloped area is a continuation of the slope down from the freeway right-of-way above the project site.

III. ENVIRONMENTAL ANALYSIS

See attached Initial Study Checklist and the biological resources report and following Discussion.

IV. DISCUSSION

Land Use

The proposal includes a boundary adjustment to the Multi-Habitat Planning Area (MHPA). The twelve-acre, development area includes a 2.2-acre portion of a strip currently in the MHPA, containing non-native grassland. This area would be removed from the MHPA and replaced with a 6.46-acre area adjoining the development site to the west which would be placed into the MHPA.

The proposed project is consistent with the Land Use Adjacency Guidelines of the MSCP Subarea Plan. Specifically, the drainage from the project would not drain directly into the adjacent MHPA. All runoff would initially be directed to grassy-swale, detention basins. Horse manure would be removed from the project site and the park trails and properly disposed in sealed storage containers. Minimal lighting would be used near the proposed main park structure. This lighting would be required to be low intensity and shielded and directed away from the adjacent MHPA. Temporary construction noise impacts to sensitive species in the adjacent MHPA, would not exceed 60 dB (hourly average) during

the breeding seasons. Signage, fencing, and landscaping would be used to direct park users from sensitive areas throughout the park incliuding the adjacent Caltrans mitigation site. All site landscaping would be native plant species. The proposed structures are located on site such that brush management would avoid adverse effects to MSCP covered species and sensitive vegetation. Grading would be minimal; no manufactured slopes would extend into the adjacent MHPA.

Biological Resources

The proposed development of the 11.77-acre project site, would result in the loss of 0.67 acre of coastal sage scrub, 0.41 acre of broom baccharis scrub, and 10.0 acres of non-native grasslands; this impacted area includes 2.2-acre portion of a strip currently in the MHPA, containing non-native grassland. This impact is proposed to be mitigated by a 6.46-acre area adjoining the development site to the west, containing 2.62 acres of broom baccharis scrub, 1.9 acres of coastal sage scrub, 1.3 acres of non-native grasslands, and 0.30 acre of non-native grassland. (See Tables 6 and 7 of the attached biological resources report.) In addition, this 6.46-acre mitigation area would be boundary adjusted and added to the MHPA. (See MMRP and attached Figure 3.)

A potential impact of the equestrian uses and resultant manure is the attraction of the brown-headed cowbirds to the project vicinity. These parasitic birds are known to lay their eggs in the endangered least Bell's vireo nests, and the bigger cowbird hatchlings crowd out the vireos hatchlings. The adjacent San Diego River area within the extended project vicinity is a known habitat for the least Bell's vireo. Therefore it becomes paramount that the proposed operation of the facilities including the increased use by horse riders on the existing park trails, does not attract cowbirds and adversely effect the endangered vireos. Preventive measures including limited construction/grading activities during the breeding season and on-going removal of horse manure from the facilities and the park trails, are required. (See MMRP.)

In addition, the project vicinity is known habitat for the threatened California gnatcatcher, and the extensive grasslands is foraged by raptor bird species. Indirect adverse effects due to potentially excessive noise caused by grading/construction during breeding season of the endangered least Bell's vireo, the threatened gnatcatcher, and protected raptors must be avoided. (See MMRP.)

The project site is adjoined by the Caltrans mitigation site to the south. This sensitive area must be protected from inadvertent adverse effects by park users attracted to the area by the improved facilities. Protective measures include use of signage, fencing, and landscaping to direct park users away from sensitive areas including the adjacent Caltrans mitigation site. (See MMRP.)

There were eight "road pools" detected in SDG&E access road and reported in the biological survey conducted by the project biology consultant. These "pools" contained

no evidence of vernal pool or wetland vegetation; they were not City-defined wetlands. One of these "pools" is located in the area of impact. It was initially reported that these "pools" were mapped because of their potential for supporting the endangered San Diego fairy shrimp. Upon further discussion and clarifications, it was determined that it would be much more accurate to describe these "pools" as recent road ruts with very low potential for the endangered shrimp to occur. This determination was based on the fact that the access road on which they occur, was built approximately eight years ago when the Caltrans mitigation site was graded and the absence of vernal pool habitat in the immediate project vicinity. Nearest known vernal pools occur in the western portion of Mission Trials Regional Park near the County Water Authority pipeline corridor over 2 miles to the west.

Historical Resources (Archaeology)

A site-specific survey was conducted on the proposed development area by a qualified archaeologist. There were no detected or suspected historic resources on the immediate project site. However, the proposed facilities improvement would allow increased use of the existing park trail system by horse and bicycle riders, and this increased use would increase trail erosion and may adversely effect known significant sites traversed by the trails throughout park. Of specific concern is the treatment of the Oak Canyon and Grasslands Loop Trails as they cross this recorded site (CA-SDI-203), a large and significant resource just north of Mission Dam. At these specific sections of these two trails, the trail surface must be covered/protected such that increased use of these sections do not expose the underlying midden. Once covered or protected, periodic inspection/ maintenance of these sections by Park rangers must occur to assure that the path is not eroding into this archaeological site. (See MMRP.)

Water Quality/Runoff Control

Currently the project site flows either southwestward towards the western drainage (out of Little Sycamore Canyon) or south-southeast, across the Caltrans mitigation site to the San Diego River. Once graded and developed, the site with its parking lots, equestrian uses, and potential use of a septic system, all runoff from the developed area needs to be initially detained and treated. In addition the flows going off-site must be slowed to avoid accelerated erosion and potential increased siltation of the river. (See MMRP.)

On-Site Wastewater Treatment

The project vicinity, the area generally north of the San Diego River, is provided public sewer service by the Padre Dam Water District. However, the nearest trunk sewer pipeline is upslope at Mast Boulevard from the proposed staging area, and, therefore, to connect to public sewer, the development would need to include a sewer pump. At this

time, the City Park and Recreation Department, the applicant wishes to avoid the cost and maintenance of a sewer pump station on-site. The alternative is a septic system. The USDA soil survey report shows that the project site which lies on alluvium, is generally appropriate for a septic system. If a septic system is proposed to be used on site for the public restrooms, the kitchen, and whatever wastewater is generated from the maintenance facility, the leach lines/field must be located such that there would be no direct influent flows into the 100 year floodplain of westerly drainage, the detention basins on site, the Caltrans mitigation site, and/or the San Diego River. Measures must prevent mixture of flows from the leach fields into the runoff detention basins; this may present a problem during the rain season. The design/placement of septic system including the location of the leach fields would require a permit from the County Health Department.

V. RECOMMENDATIONS:

On the basis of this initial evaluation:

___ The proposed project would not have a significant effect on the environment, and a NEGATIVE DECLARATION should be prepared.

X Although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because the mitigation measures described in Section IV above, have been added to the project. A MITIGATED NEGATIVE DECLARATION should be prepared.

___ The proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT should be required.

PROJECT ANALYST: John M. Kovac

Attachments:

Figure 1: Project Location Map
Figure 2: Vicinity Map
Figure 3: Biological Resources/MHPA Map
Figure 4: Conceptual Site Plan
Figure 5: Main Building Elevations
Figure 6: Stormwater Runoff Detention Basin Map
Initial Study Checklist
Biological Survey Report

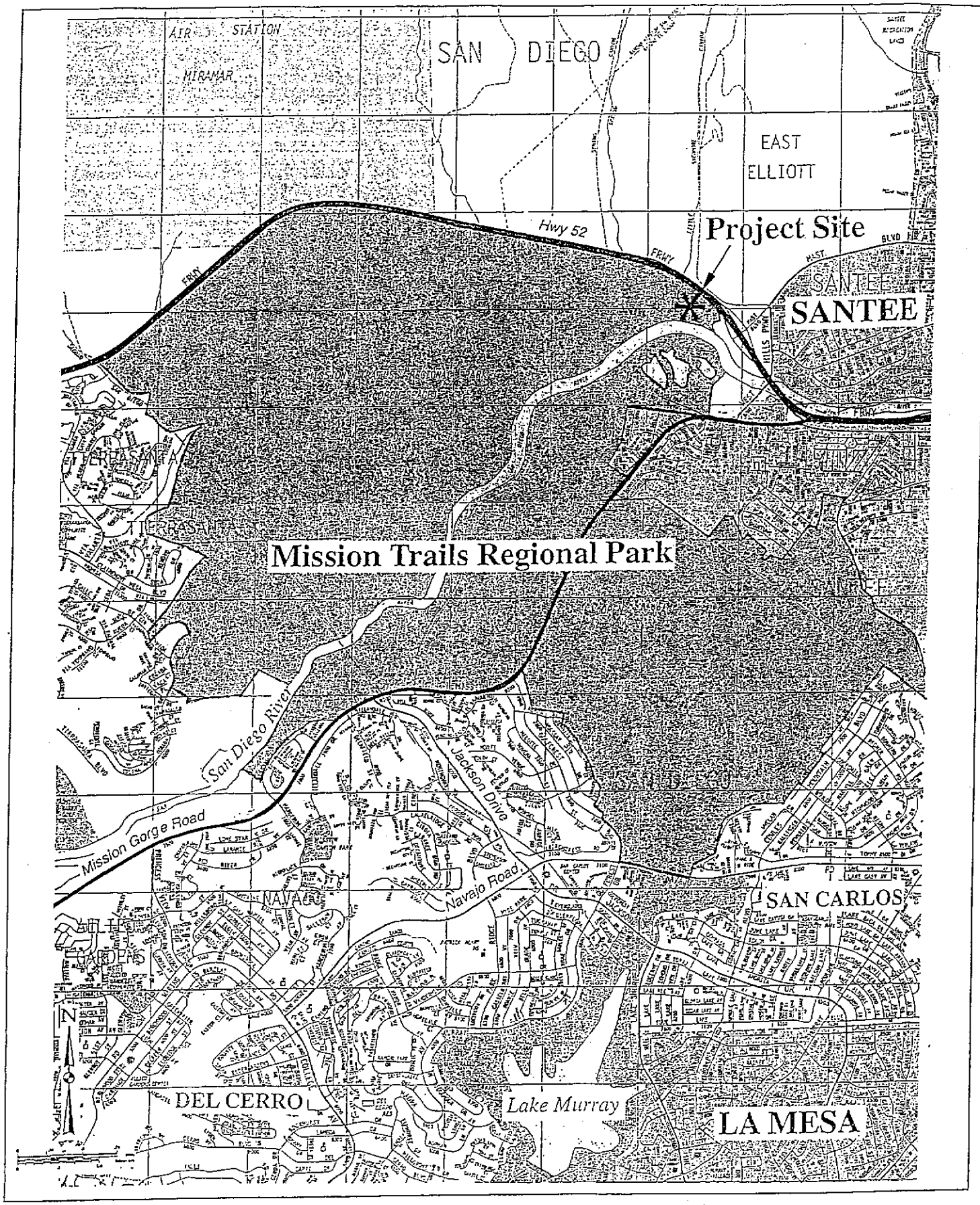

FIGURE 1: PROJECT LOCATION

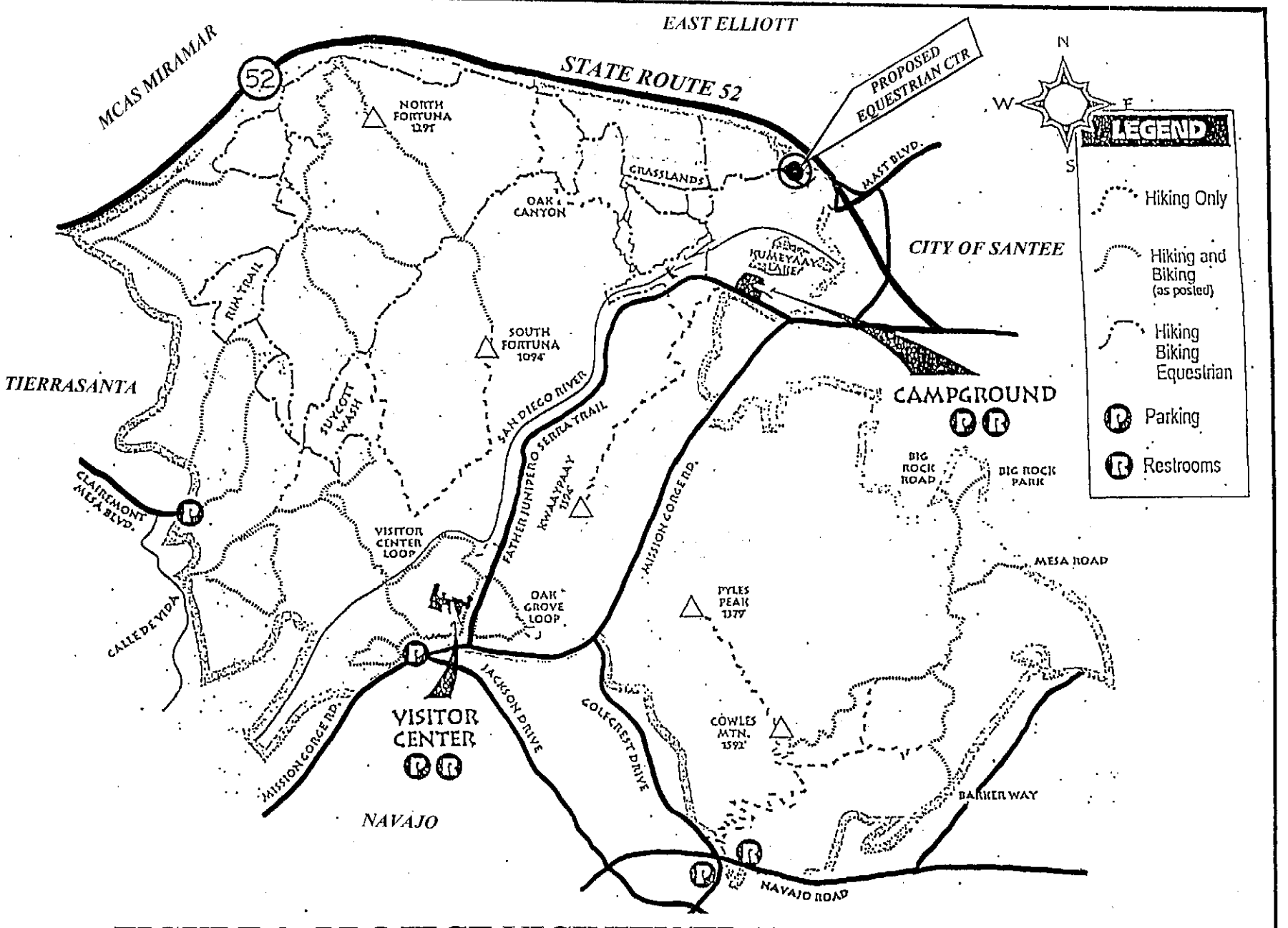

FIGURE 2: PROJECT VICINITY/TRAIL SYSTEM

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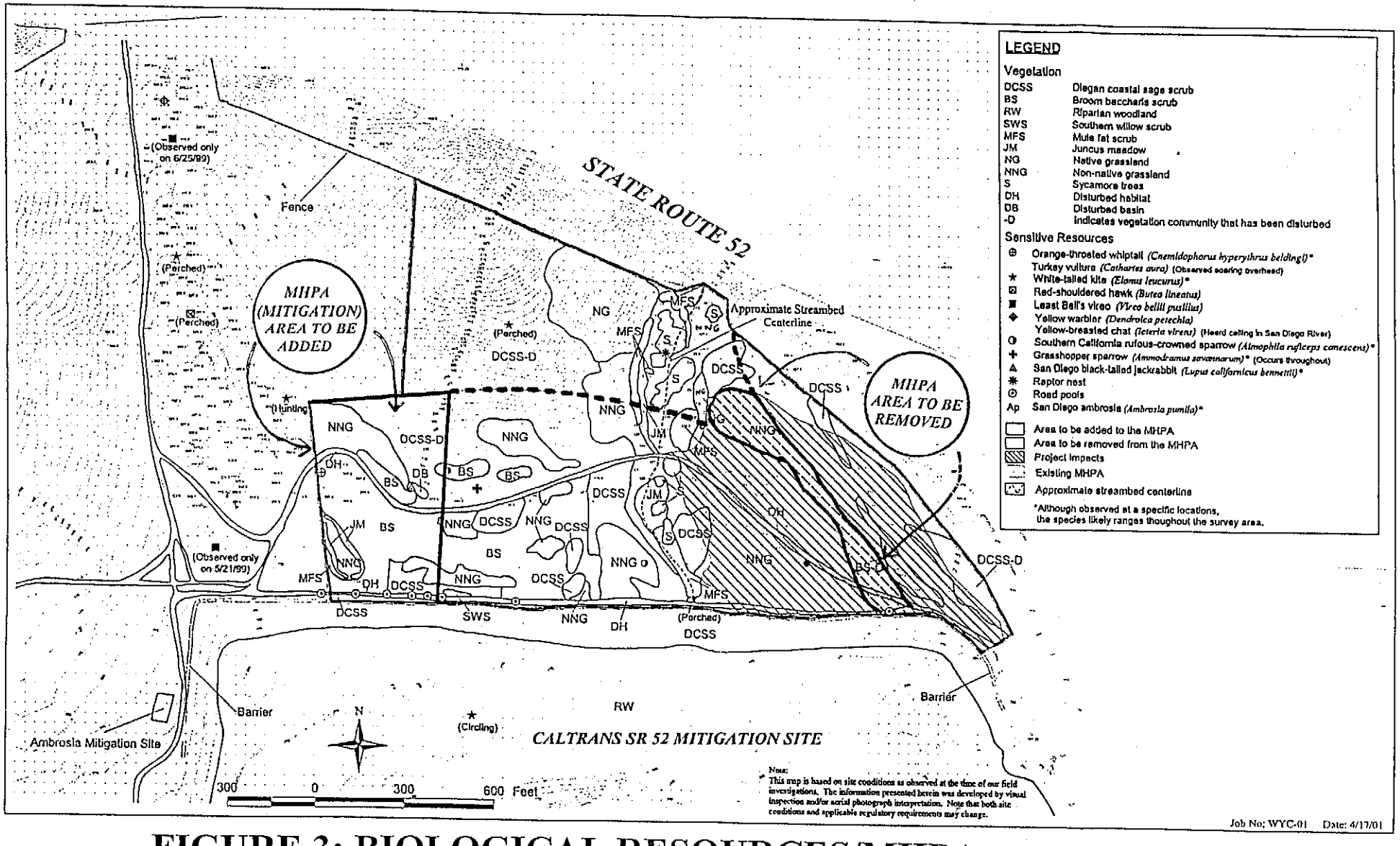

FIGURE 3: BIOLOGICAL RESOURCES/MHPA

MISSION TRAILS PARK - MULTI-USE STAGING FACILITY

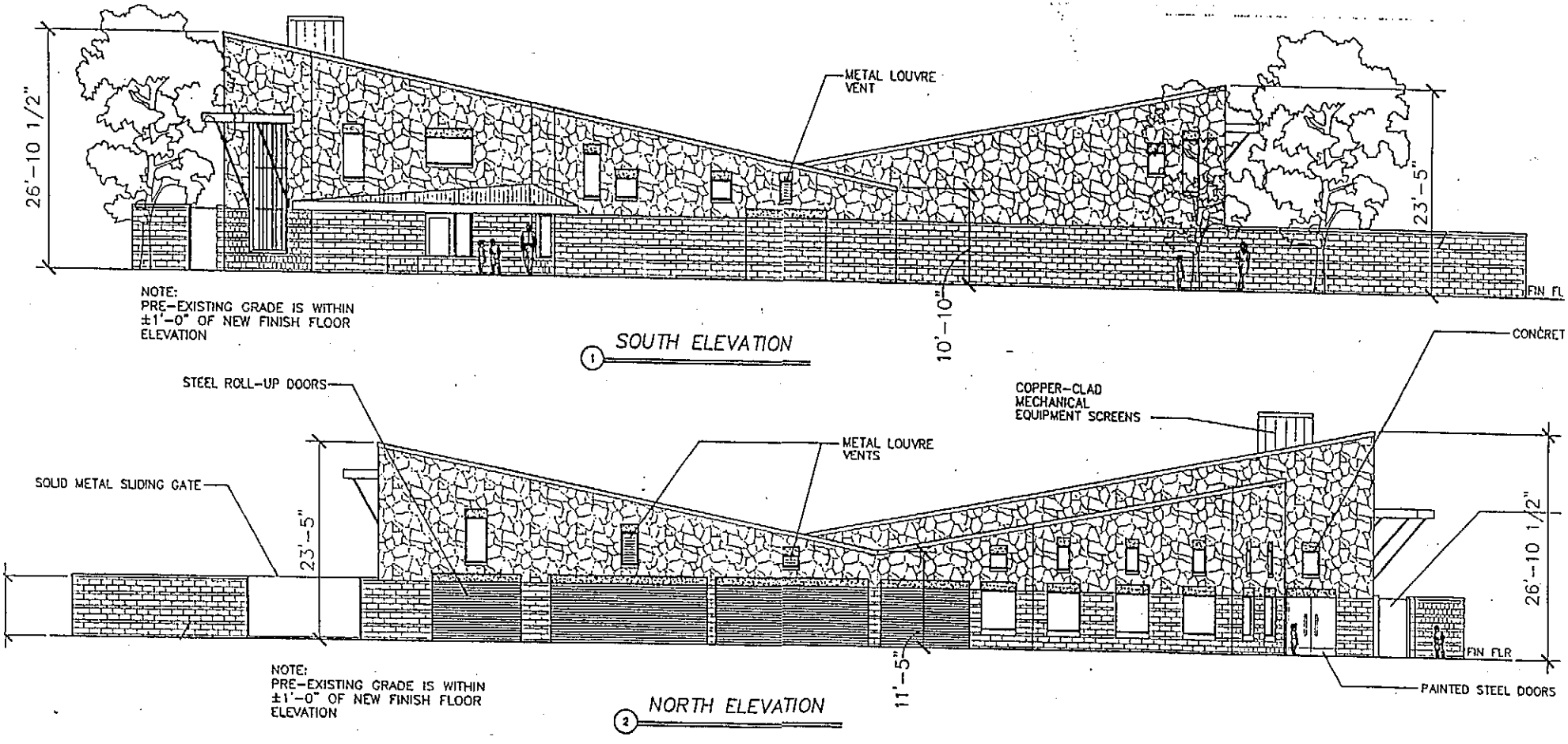

FIGURE 5: MAIN BUILDING ELEVATIONS

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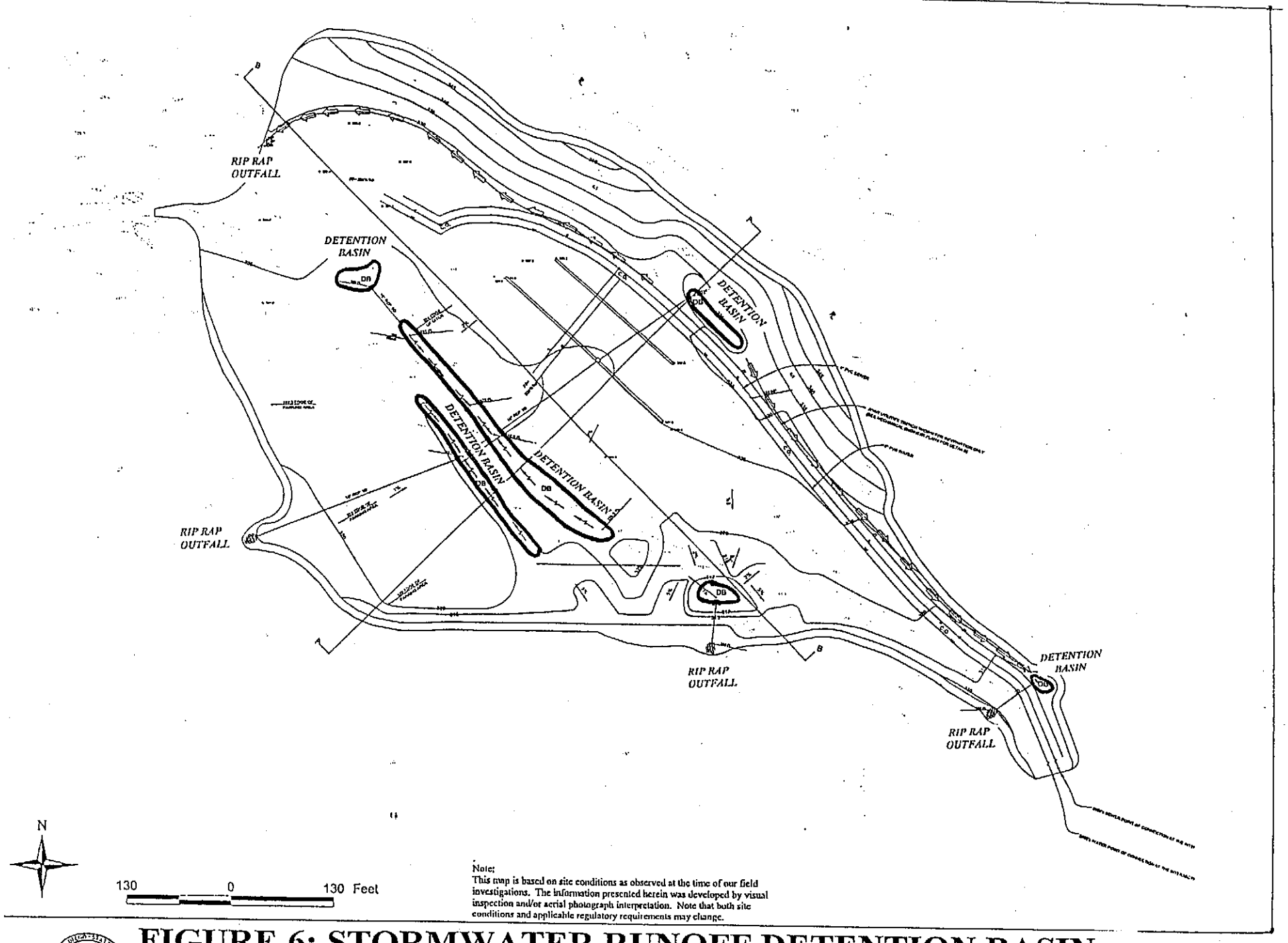

FIGURE 6: STORMWATER RUNOFF DETENTION BASIN

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III. ENVIRONMENTAL ANALYSIS:

This Initial Study checklist is designed to identify the potential for significant environmental impacts which could be associated with a project. All answers of "yes" and "maybe" indicate that there is a potential for significant environmental impacts and these determinations are explained in Section IV.

	Yes	Maybe	No
A. Geology/Soils. Will the proposal result in:			
1. Exposure of people or property to geologic hazards such as earthquakes, landslides, mudslides, ground failure, or similar hazards? Project site is on recent alluvium and is rated as high potential for liquefaction. Proposal includes single-story recreational facility/structure; no residential use proposed.	___	X	___
2. Any increase in wind or water erosion of soils, either on or off the site? No increase in erosion would occur.	___	X	___
B. Air. Will the proposal result in:			
1. Air emissions which would substantially deteriorate ambient air quality? Proposed community/recreational use only. No significant air emissions would not occur.	___	___	X
2. The exposure of sensitive receptors to substantial pollutant concentrations? No such concentrations on or near site; surrounding.	___	___	X
3. The creation of objectionable odors? Odors could occur; need mature control SEE DISCUSSION.	___	X	___
4. The creation of dust? The potential for short-term dust only to occur during construction - not significant.	___	___	X

		YES	MAYBE	NO
5.	Any alteration of air movement in the area of the project? One-story recreational bldg. Air movement would not be altered.	___	___	X
6.	A substantial alteration in moisture, or temperature, or any change in climate, either locally or regionally? No climate changes would result from this project.	___	___	X

C. Hydrology/Water Quality. Will the proposal result in:

1.	Changes in currents, or the course or direction of water movements, in either marine or fresh waters? All development outside of floodplain.	___	___	X
2.	Changes in absorption rates, drainage patterns, or the rate and amount of surface runoff? Potential significant changes to drainage or runoff could occur; require runoff/water quality controls. SEE DISCUSSION.	X	___	___
3.	Alterations to the course or flow of flood waters? SEE C1.	___	___	X
4.	Discharge into surface or ground waters, or in any alteration of surface or ground water quality, including, but not limited to temperature, dissolved oxygen or turbidity? Recreational/equestrian uses only on 12-acre site. Possible use of on-site septic system for all wastewater from public bathrooms and kitchen; revised project includes initial capture/treatment of all site runoff. SEE DISCUSSION.	___	X	___
5.	Discharge into surface or ground waters, significant amounts of pesticides, herbicides, fertilizers, gas, oil, or other noxious chemicals? Recreational/equestrian uses only. Such substances not expected be discharged in significant amounts, into surface or ground water.	___	___	X

	YES	MAYBE	NO
6. Change in deposition or erosion of beach sands, or changes in siltation, deposition or erosion which may modify the channel of a river or stream or the bed of the ocean or any bay, inlet or lake? Project site drains into the San Diego River - less than one-quarter mile south of the project site. See D4.	___	X	___
7. Exposure of people or property to water related hazards such as flooding? Proposed development not within 100-yr floodplain; proposed development site east of 100-year floodplain of adjoining drainage.	___	___	X
8. Change in the amount of surface water in any water body? Not applicable.	___	___	X

D. Biology. Will the proposal result in:

1. A reduction in the number of any unique, rare, endangered, sensitive, or fully protected species of plants or animals? SEE DISCUSSION and attached Biological Resources Survey report. Site contains non-native grasslands and adjoins endangered least Bell's vireo mitigation land and MHPA.	X	___	___
2. A substantial change in the diversity of any species of animals or plants? No substantial change would occur.	___	___	X
3. Introduction of invasive species of plants into the area? No invasive plant species would be introduced; consistent w/MSCP Adjacency Guidelines.	___	___	X

		YES	MAYBE	NO
4.	Interference with the movement of any resident or migratory fish or wildlife species? No interference with wildlife movement expected to occur.	___	___	X
5.	An impact on a sensitive habitat, including, but not limited to streamside vegetation, oak woodland, vernal pools, coastal salt marsh, lagoon, wetland, or coastal sage scrub or chaparral? SEE DISCUSSION; SEE D1.	___	X	___
6.	Deterioration of existing fish or wildlife habitat? SEE DISCUSSION; SEE D1.	___	X	___

E. Noise. Will the proposal result in:

1.	A significant increase in the existing ambient noise levels? Potential increase to the existing noise level during site grading and/or facilities construction could occur; potential adverse effects on adjoining areas containing endangered species; mitigation required. SEE DISCUSSION.	X	___	___
2.	Exposure of people to noise levels which exceed the City's adopted noise ordinance? Site within regional park; no adverse noise effects on human residences.	___	___	X
3.	Exposure of people to current or future transportation noise levels which exceed standards established in the Transportation Element of the General Plan? SEE E2.	___	___	X

		YES	MAYBE	NO
F.	Light, Glare and Shading. Will the proposal result in:			
1.	Substantial light or glare? No substantial lighting proposed; proposed day use only; required MHPA adjacency guidelines adherrance.	___	___	X
2.	Substantial shading of other properties? Project would not shade other properties.	___	___	X
G.	Land Use. Will the proposal result in:			
1.	A land use which is inconsistent with the adopted community plan land use designation for the site? The proposed recreational development is consistent with park plan and adopted MSCP subarea plan. SEE DISCUSSION.	___	___	X
2.	A conflict with the goals, objectives and recommendations of the community plan in which it is located? SEE G1 & DISCUSSION.	___	___	X
3.	A conflict with adopted environmental plans for the area? SEE G1 & DISCUSSION.	___	___	X
4.	Land uses which are not compatible with aircraft accident potential as defined by a SANDAG Airport Land Use Plan (ALUP)? Site not subject to an ALUP.	___	___	X

		YES	MAYBE	NO
H.	Natural Resources. Will the proposal result in:			
	1. The prevention of future extraction of sand and gravel resources? The proposal is a recreational use in a regional park; the proposed relatively minor improvements would not adversely effect sand or gravel resources if future extraction becomes a critical need.	___	___	X
	2. The conversion of agricultural land to nonagricultural use or impairment of the agricultural productivity of agricultural land? See H1.	___	___	X
I.	Recreational Resources: Will the proposal result in an impact upon the quality or quantity of existing recreational opportunities? The proposed improvemants affords new/improved recreational opportunities in a regional park.	___	___	X
J.	Population. Will the proposal alter the planned location, distribution, density, or growth rate of the population of an area? Proposed recreational use within a existing regional park, would not significantly alter the location, density or growth of the surrounding population.	___	___	X
K.	Housing. Will the proposal affect existing housing in the community, or create a demand for additional housing? Project would not affect existing or future housing. See J.	___	___	X

L. Transportation/Circulation. Will the proposal result in:

	YES	MAYBE	NO
1. Traffic generation in excess of specific/ community plan allocation? Proposed community center; estimated traffic would not exceed community plan allocation.	___	___	X
2. An increase in projected traffic which is substantial in relation to the capacity of the street system? Project caused traffic would not significantly impact street system. SEE DISCUSSION.	___	___	X
3. An increased demand for off-site parking? No increased demand for off-street parking would result from this project; sufficient on site parking proposed.	___	___	X
4. Effects on existing parking? The need for off-street parking would be incorporated into the project.	___	___	X
5. Substantial impact upon existing or planned transportation systems? No impact on the existing system would occur; proposed improvements within regional park.	___	___	X
6. Alterations to present circulation movements including effects on existing public access to beaches, parks, or other open space areas? The proposal would not significantly affect the present circulation system. See L5.	___	___	X
7. Increase in traffic hazards to motor vehicles, bicyclists or pedestrians? No increased hazards would occur; staging area for use of park trails is proposed.	___	___	X

		YES	MAYBE	NO
M.	Public Services. Will the proposal have an effect upon, or result in a need for new or altered governmental services in any of the following areas:			
	1. Fire protection? Area services are adequate.	___	___	X
	2. Police protection? Area services are adequate.	___	___	X
	3. Schools? Area services are adequate.	___	___	X
	4. Parks or other recreational facilities? Proposal is a public recreational development.	___	___	X
	5. Maintenance of public facilities, including roads? Area services are adequate.	___	___	X
	6. Other governmental services? Area services are adequate.	___	___	X
N.	Utilities. Will the proposal result in a need for new systems, or require substantial alterations to existing utilities, including:			
	1. Power? All utilities are available.	___	___	X
	2. Natural gas? All utilities are available.	___	___	X
	3. Communications systems? All utilities are available.	___	___	X
	4. Water? All utilities are available.	___	___	X

		YES	MAYBE	NO
5.	Sewer? Area serviced by public sewer through Padre Dam Water District. The site can either pump wastewater to public sewer or install on-site septic system	___	___	X
6.	Storm water drainage? All utilities are available.	___	___	X
7.	Solid waste disposal? All utilities are available.	___	___	X
O.	Energy. Will the proposal result in the use of excessive amounts of fuel or energy? No excessive energy would be required.	___	___	X
P.	Water Conservation. Will the proposal result in:			
1.	Use of excessive amounts of water? No excessive water would be required.	___	___	X
2.	Landscaping which is predominantly non-drought resistant vegetation? Landscaping would be in compliance with the MSCP Subarea Plan; proposed plantings are drought-tolerant, native species.	___	___	X
Q.	Neighborhood Character/Aesthetics. Will the proposal result in:			
1.	The obstruction of any vista or scenic view from a public viewing area? No such public views would be obstructed/adversely effected.	___	___	X
2.	The creation of a negative aesthetic site or project? The proposed recreational facility is located on the northeastern edge of the regional park adjacent to and below the SR 52 right-of-way.	___	___	X

		YES	MAYBE	NO
3.	Project bulk, scale, materials, or style which will be incompatible with surrounding development? Bulk, scale, materials and style of proposed facility with the proposed landscaping would be compatible with the surrounding area. Also see Q2.	___	___	X
4.	Substantial alteration to the existing character of the area? Project should be compatible with the existing character of the area. SEE Q2.	___	___	X
5.	The loss of any distinctive or landmark tree(s), or a stand of mature trees? No such loss would occur. Adjoining sycamore woodlands would not be adversely effected.	___	X	___
6.	Substantial change in topography or ground surface relief features? Proposed development on the relatively flat portion of the site. Relatively minor grading required.	___	___	X
7.	The loss, covering or modification of any unique geologic or physical features such as a natural canyon, sandstone bluff, rock outcrop, or hillside with a slope in excess of 25%? No such modification or covering would occur. SEE Q6.	___	___	X

R. Cultural Resources. Will the proposal result in:

1.	Alteration of or the destruction of a prehistoric or historic archaeological site? No such resources remain/identified on immediate development site. Potential intensified trail use engendered/facilitated by the improvements may adversely effect known archaeological resources. SEE DISCUSSION.	___	X	___

		YES	MAYBE	NO
2.	Adverse physical or aesthetic effects to a prehistoric or historic building, structure, object, or site? No such resources remain on the development site. Also SEE R1.	___	X	___
3.	Adverse physical or aesthetic effects to an architecturally significant building, structure, or object? SEE R1.	___	___	X
4.	Any impact to existing religious or sacred uses within the potential impact area? No such uses suspected.	___	___	X
S.	Paleontological Resources. Will the proposal result in the loss of paleontological resources? Site underlain by recent alluvium - very low potential for fossil resources: site grading would be relatively minimal.	___	___	X
T.	Human Health/Public Safety. Will the proposal result in:			
1.	Creation of any health hazard or potential health hazard (excluding mental health)? No such health hazards would be created.	___	___	X
2.	Exposure of people to potential health hazards? No such hazards on site.	___	___	X
3.	A future risk of an explosion or the release of hazardous substances (including but not limited to gas, oil, pesticides, chemicals, radiation, or explosives)? Proposed recreational/community use only. No such risk would be created.	___	___	X

	YES	MAYBE	NO
U. Mandatory Findings of Significance.			
1. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory? This project would not result in any of the above mentioned impacts.	___	___	X
2. Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals? (A short-term impact on the environment is one which occurs in a relatively brief, definitive period of time while long-term impacts will endure well into the future.) No such short or long term impacts would be created/suspected.	___	___	X
3. Does the project have impacts which are individually limited, but cumulatively considerable? (A project may impact on two or more separate resources where the impact on each resource is relatively small, but where the effect of the total of those impacts on the environment is significant.) Project would not have a considerable cumulative impact.	___	___	X
4. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly? No direct or indirect impacts to humans would result from this project.	___	___	X

Mission Trails Regional Park Multi-use Staging Area Project

BIOLOGICAL TECHNICAL REPORT
Site Development Permit No. 40-0524
P2K No. 96003410-P-2

August 20, 2001

Prepared for:

WIMMER YAMADA & CAUGHEY
561 Fifth Avenue
San Diego, California 92101

Prepared by:

HELIX ENVIRONMENTAL PLANNING, INC.
8100 La Mesa Boulevard, Suite 150
La Mesa, California 91941-6476

Mission Trails Regional Park
Multi-use Staging Area Project
Biological Technical Report

TABLE OF CONTENTS

TABLE OF CONTENTS (cont.)

LIST OF FIGURES

LIST OF TABLES

From: "David Mayer" <DMayer@dfg.ca.gov>
To: <R4R@sdcity.sannet.gov>
Date: Friday, August 17, 2001 2:56PM
Subject: Re: Raptor Breeding Season

Randy,

Several of us had a conversation on this topic a couple weeks ago. I wish I had a simple answer, so if you want a fast answer skip to the last paragraph. The best answer is from Feb 1 through mid August. In most cases, you would expect that a raptor nest would have fledged (and have young which can fly reasonably well, though would not necessarily be independent of the parents) by the end of July. Species such as Cooper's hawk or American kestrel may start a bit later and take until early/mid August. Most passerines have also usually fledged by the end of July. There are some rare occurrences of late nesting, which is why the gnatcatcher nesting period was extended to the end of August.

On the front end of the season, March/April/May is most common, but February is not too uncommon. So, to protect raptors that have set up a territory and are about to lay eggs, we use February 1 as the start of the season. Sometimes owls (great horned owls, barn owls, etc) start in January or even December, so a biologist should check before construction begins if there is any potential for owls. Also, both non-native trees (eucs, pepper, etc) and the more typical native trees, as well as rock outcrop or cliff habitat, can all support nesting by some raptor species. I have been told that Cooper's hawks even use large lemonade-berry or sumac in some areas.

Okay, so to sum up this long-winded response: Feb 1 through July 31 is most likely sufficient, but there may be a need to delay until mid August in some circumstances. Owls may begin nesting as early as late December or January.

Dave Mayer
California Department of Fish & Game
South Coast Region
4949 Viewridge Avenue
San Diego, CA 92123
858-467-4234 (phone)
858-467-4299 (fax)
dmayer@dfg.ca.gov

>>> "Randy Rodriguez" <R4R@sdcity.sannet.gov> 08/16/01 04:24PM >>>
Hi David:

Do you know what DFG defines as the raptor breeding season in San Diego County? It's my understanding that December to June is the typically considered the raptor breeding season to capture all potential raptor species (including incidental winter breeding). The question relates to grading restrictions if an active nest is detected on-site. I would appreciate any insight you may have. Hope all is well. Thanks.

Randy

City of San Diego
Development Services Department
LAND DEVELOPMENT REVIEW
1222 First Avenue, Mail Station 501
San Diego, CA 92101
(619) 446-5460

INITIAL STUDY
LDR No. 40-0524

SUBJECT: Mission Trails Regional Park - Multi-Use Staging Area Project: APPROVAL of a SITE DEVELOPMENT PERMIT (LDR No.40-0524) to allow the development of a twelve-acre, multi-use staging area to improve access to the City's Mission Trails Regional Park by horse riders, hikers, and bicyclists to the existing park trail system. The proposed improvements include a 5,000-square-foot, main structure containing park maintenance facility, park ranger offices, conference room, display room with information counter, park staff restroom with shower, garage, group kitchen, public restrooms, and storage room, a 2,300 s.f. covered group picnic shelter attached to the west side, and a screened storage yard attached to the east side. There would be a separate, 425 s.f service building containing public restrooms, 15-space parking lot for horse trailers, 49-space parking lot for other vehicles, horse corrals, two multi-purpose rings, open BBQ area, picnic tables, horse manure storage bins, minimal security lighting, and internal loop access road. The maximum height of the main structure would be 26 feet, 10 inches; the height of the roof over the group picnic area would be a maximum of 18 feet, 9 inches. The project site is located in the northeastern portion of Mission Trails Regional Park about 300 yards east of the Mast Boulevard underpass of SR 52. The site is bounded by the right-of-way of SR 52 to the north, the drainage out of Little Sycamore Canyon to the west, and a Caltrans mitigation site and the San Diego River to the south.
Applicant: City of San Diego, Park and Recreation Department

I. PURPOSE AND MAIN FEATURES:

Background

The project site is a portion of the 30-acre site which was not placed within the Multi-Habitat Planning Area (MHPA), the City's planned wildlife preserve which would implement the adopted Multiple Species Conservation Program (MSCP). This exclusion is stated in the 1997 MSCP Subarea Plan. In addition, passive recreational uses such as use of trails within the MHPA is also consistent with the Subarea Plan.

The development of Mission Trails Regional Park, the implementation of the park plan, began with the construction of the Visitors Center (EIR No.90-0980; dated September 8, 1992) and continued with the installation of the western park trails staging area at the eastern terminus of Clairemont Mesa Boulevard (MND No. 95-0638; dated November 11, 1996). In addition, there have been improvements at the Old Mission Dam area (ND

No. 96-0269; dated July 5, 1996). The current proposal, the subject of this document, would complete the staging area for the northern portion of the park.

Project Description

The proposed project is the development of a twelve-acre, multi-use staging area to allow access of the City's Mission Trails Regional Park by horse riders, hikers, and bicyclists. The proposal would facilitate access to the existing park trail system from the northern portion of the park. (See attached Figures 1, 2, and 4.) The proposed improvements include a 5,000 square feet, main structure northwestern portion of the project site, containing park maintenance facility, park ranger offices, conference room, display room with information counter, park staff restroom with shower, garage, group kitchen, public restrooms, and storage room, a 2,300 s.f. covered group picnic shelter attached to the west side, and a screened storage yard for park maintenance attached to the east side. The maximum height of the main structure would be 26 feet, 10 inches; the height of the roof over the group picnic area would be a maximum of 18 feet, 9 inches. There would be a separate, 425 s.f service building in the central portion of the site, containing public restrooms. Other proposed improvements include a 15-space parking lot for horse trailers, 49-space parking lot for other vehicles, horse corrals, two multi-purpose rings, open BBQ area, picnic tables, horse manure storage bins, minimal security lighting, and an internal loop access road. The entrance at the terminus of Mast Boulevard, would contain a locked gate such that the closed facility would be secured at night. An ADA accessible walkway would extend from the entrance at Mast Boulevard to the main facility building on the northwestern portion of the site.

All runoff from the project site would be routed to five detention basins spread throughout the site with two large, linear basins serving the parking lots, equestrian rings, and horse corral area. (See attached Figures 4 and 6.) Treated flows from these basins would be directed to a dissipating, rip-rapped outlets before flowing southwards towards the river.

Environmental Setting

The 12-acre, project site is located in the northeastern portion of Mission Trails Regional Park about 300 yards east of the Mast Boulevard underpass of SR 52. The site is bounded by the right-of-way of SR 52 to the north, the drainage out of Little Sycamore Canyon to the west, and a Caltrans mitigation site and the San Diego River to the south. Much of the currently undeveloped site contains non-native grasslands with patches of native vegetation. (See attached Figure 3.) The project would impact one acre of coastal sage scrub and broom baccharis scrub. The project site is a portion of the 30 acre site which was not placed within the Multi-Habitat Planning Area (MHPA), the City's planned wildlife preserve which would implement the adopted Multiple Species Conservation Program (MSCP).

The project site is flanked on the west by a drainage which flows from Little Sycamore Canyon under SR 52 through a culvert, drains the western portion of the project site, and

eventually flows into the San Diego River. Near or parallel to this drainage are scattered sycamores and patches of mulefat scrub and juncus meadow. The proposed improvements are located outside the 100-year floodplain of this drainage and would not adversely effect the sensitive native vegetation associated with the drainage. No improvements are proposed to the existing trail crossing of this drainage.

Immediately to the south of the project site, across an existing SDG&E dirt access road, is the Caltrans mitigation site for impacts from the construction of SR 52. This area has been graded down towards the river level approximately eight years ago and is currently covered predominately by previously planted cottonwoods. A manufactured slope separates the project site from the mitigation site. The San Diego River flows further south approximately one-quarter mile south of the project site.

The majority of the site slopes gently to the south southeast. The project site drops in elevation from 350 feet MSL along its northern boundary to 310 feet MSL along the southern access road. A drop of 40 feet over a distance of over 500 feet occurs across the site with a 20-foot drop occurring along the 160-feet-wide, northern portion. This northern sloped area is a continuation of the slope down from the freeway right-of-way above the project site.

III. ENVIRONMENTAL ANALYSIS

See attached Initial Study Checklist and the biological resources report and following Discussion.

IV. DISCUSSION

Land Use

The proposal includes a boundary adjustment to the Multi-Habitat Planning Area (MHPA). The twelve-acre, development area includes a 2.2-acre portion of a strip currently in the MHPA, containing non-native grassland. This area would be removed from the MHPA and replaced with a 6.46-acre area adjoining the development site to the west which would be placed into the MHPA.

The proposed project is consistent with the Land Use Adjacency Guidelines of the MSCP Subarea Plan. Specifically, the drainage from the project would not drain directly into the adjacent MHPA. All runoff would initially be directed to grassy-swale, detention basins. Horse manure would be removed from the project site and the park trails and properly disposed in sealed storage containers. Minimal lighting would be used near the proposed main park structure. This lighting would be required to be low intensity and shielded and directed away from the adjacent MHPA. Temporary construction noise impacts to sensitive species in the adjacent MHPA, would not exceed 60 dB (hourly average) during

the breeding seasons. Signage, fencing, and landscaping would be used to direct park users from sensitive areas throughout the park incliuding the adjacent Caltrans mitigation site. All site landscaping would be native plant species. The proposed structures are located on site such that brush management would avoid adverse effects to MSCP covered species and sensitive vegetation. Grading would be minimal; no manufactured slopes would extend into the adjacent MHPA.

Biological Resources

The proposed development of the 11.77-acre project site, would result in the loss of 0.67 acre of coastal sage scrub, 0.41 acre of broom baccharis scrub, and 10.0 acres of non-native grasslands; this impacted area includes 2.2-acre portion of a strip currently in the MHPA, containing non-native grassland. This impact is proposed to be mitigated by a 6.46-acre area adjoining the development site to the west, containing 2.62 acres of broom baccharis scrub, 1.9 acres of coastal sage scrub, 1.3 acres of non-native grasslands, and 0.30 acre of non-native grassland. (See Tables 6 and 7 of the attached biological resources report.) In addition, this 6.46-acre mitigation area would be boundary adjusted and added to the MHPA. (See MMRP and attached Figure 3.)

A potential impact of the equestrian uses and resultant manure is the attraction of the brown-headed cowbirds to the project vicinity. These parasitic birds are known to lay their eggs in the endangered least Bell's vireo nests, and the bigger cowbird hatchlings crowd out the vireos hatchlings. The adjacent San Diego River area within the extended project vicinity is a known habitat for the least Bell's vireo. Therefore it becomes paramount that the proposed operation of the facilities including the increased use by horse riders on the existing park trails, does not attract cowbirds and adversely effect the endangered vireos. Preventive measures including limited construction/grading activities during the breeding season and on-going removal of horse manure from the facilities and the park trails, are required. (See MMRP.)

In addition, the project vicinity is known habitat for the threatened California gnatcatcher, and the extensive grasslands is foraged by raptor bird species. Indirect adverse effects due to potentially excessive noise caused by grading/construction during breeding season of the endangered least Bell's vireo, the threatened gnatcatcher, and protected raptors must be avoided. (See MMRP.)

The project site is adjoined by the Caltrans mitigation site to the south. This sensitive area must be protected from inadvertent adverse effects by park users attracted to the area by the improved facilities. Protective measures include use of signage, fencing, and landscaping to direct park users away from sensitive areas including the adjacent Caltrans mitigation site. (See MMRP.)

There were eight "road pools" detected in SDG&E access road and reported in the biological survey conducted by the project biology consultant. These "pools" contained

no evidence of vernal pool or wetland vegetation; they were not City-defined wetlands. One of these "pools" is located in the area of impact. It was initially reported that these "pools" were mapped because of their potential for supporting the endangered San Diego fairy shrimp. Upon further discussion and clarifications, it was determined that it would be much more accurate to describe these "pools" as recent road ruts with very low potential for the endangered shrimp to occur. This determination was based on the fact that the access road on which they occur, was built approximately eight years ago when the Caltrans mitigation site was graded and the absence of vernal pool habitat in the immediate project vicinity. Nearest known vernal pools occur in the western portion of Mission Trials Regional Park near the County Water Authority pipeline corridor over 2 miles to the west.

Historical Resources (Archaeology)

A site-specific survey was conducted on the proposed development area by a qualified archaeologist. There were no detected or suspected historic resources on the immediate project site. However, the proposed facilities improvement would allow increased use of the existing park trail system by horse and bicycle riders, and this increased use would increase trail erosion and may adversely effect known significant sites traversed by the trails throughout park. Of specific concern is the treatment of the Oak Canyon and Grasslands Loop Trails as they cross this recorded site (CA-SDI-203), a large and significant resource just north of Mission Dam. At these specific sections of these two trails, the trail surface must be covered/protected such that increased use of these sections do not expose the underlying midden. Once covered or protected, periodic inspection/ maintenance of these sections by Park rangers must occur to assure that the path is not eroding into this archaeological site. (See MMRP.)

Water Quality/Runoff Control

Currently the project site flows either southwestward towards the western drainage (out of Little Sycamore Canyon) or south-southeast, across the Caltrans mitigation site to the San Diego River. Once graded and developed, the site with its parking lots, equestrian uses, and potential use of a septic system, all runoff from the developed area needs to be initially detained and treated. In addition the flows going off-site must be slowed to avoid accelerated erosion and potential increased siltation of the river. (See MMRP.)

On-Site Wastewater Treatment

The project vicinity, the area generally north of the San Diego River, is provided public sewer service by the Padre Dam Water District. However, the nearest trunk sewer pipeline is upslope at Mast Boulevard from the proposed staging area, and, therefore, to connect to public sewer, the development would need to include a sewer pump. At this

time, the City Park and Recreation Department, the applicant wishes to avoid the cost and maintenance of a sewer pump station on-site. The alternative is a septic system. The USDA soil survey report shows that the project site which lies on alluvium, is generally appropriate for a septic system. If a septic system is proposed to be used on site for the public restrooms, the kitchen, and whatever wastewater is generated from the maintenance facility, the leach lines/field must be located such that there would be no direct influent flows into the 100 year floodplain of westerly drainage, the detention basins on site, the Caltrans mitigation site, and/or the San Diego River. Measures must prevent mixture of flows from the leach fields into the runoff detention basins; this may present a problem during the rain season. The design/placement of septic system including the location of the leach fields would require a permit from the County Health Department.

V. RECOMMENDATIONS:

On the basis of this initial evaluation:

___ The proposed project would not have a significant effect on the environment, and a NEGATIVE DECLARATION should be prepared.

X Although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because the mitigation measures described in Section IV above, have been added to the project. A MITIGATED NEGATIVE DECLARATION should be prepared.

___ The proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT should be required.

PROJECT ANALYST: John M. Kovac

Attachments:

Figure 1: Project Location Map
Figure 2: Vicinity Map
Figure 3: Biological Resources/MHPA Map
Figure 4: Conceptual Site Plan
Figure 5: Main Building Elevations
Figure 6: Stormwater Runoff Detention Basin Map
Initial Study Checklist
Biological Survey Report

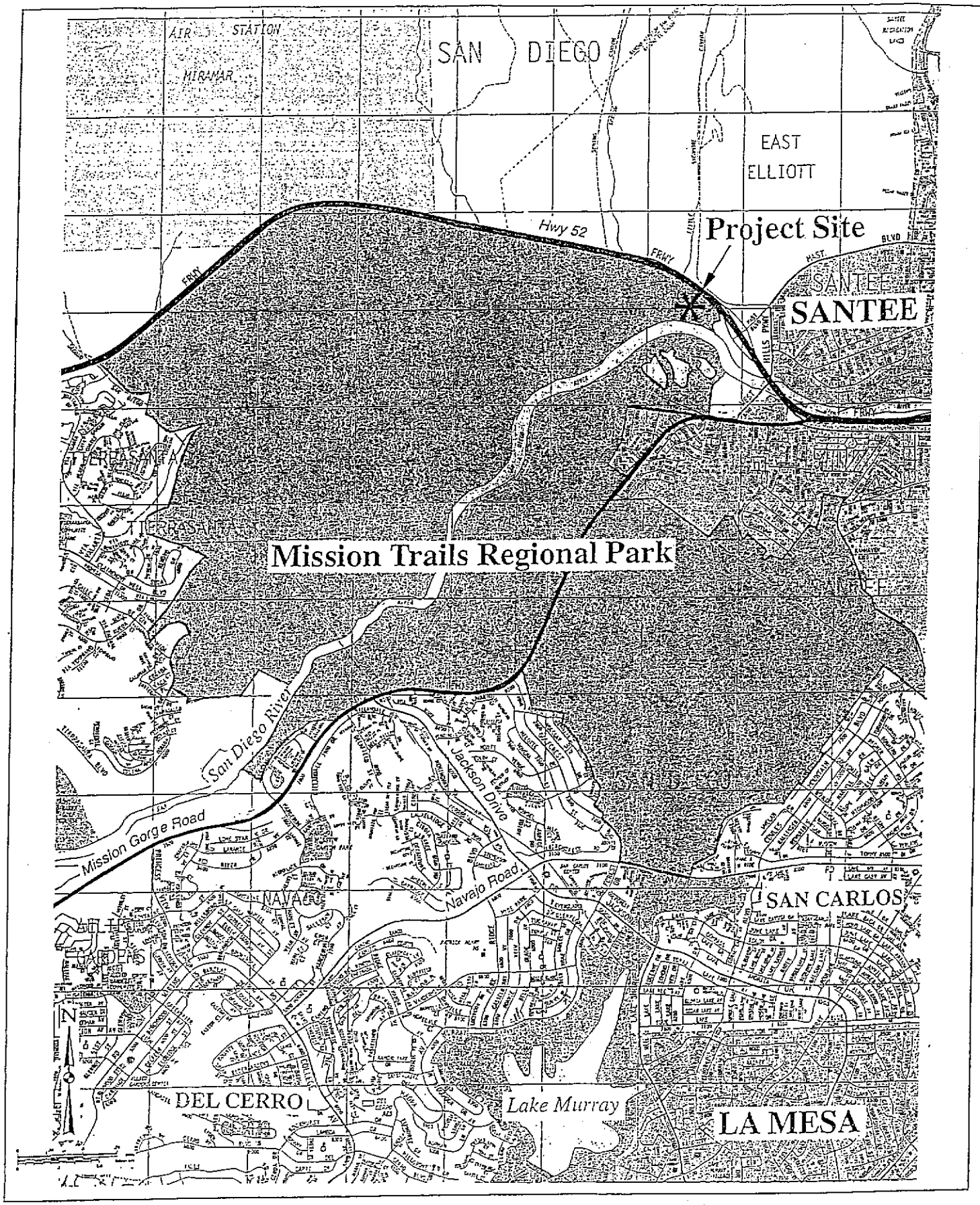


FIGURE 1: PROJECT LOCATION

III. ENVIRONMENTAL ANALYSIS:

This Initial Study checklist is designed to identify the potential for significant environmental impacts which could be associated with a project. All answers of "yes" and "maybe" indicate that there is a potential for significant environmental impacts and these determinations are explained in Section IV.

	Yes	Maybe	No
A. Geology/Soils. Will the proposal result in:			
1. Exposure of people or property to geologic hazards such as earthquakes, landslides, mudslides, ground failure, or similar hazards? Project site is on recent alluvium and is rated as high potential for liquefaction. Proposal includes single-story recreational facility/structure; no residential use proposed.	___	X	___
2. Any increase in wind or water erosion of soils, either on or off the site? No increase in erosion would occur.	___	X	___
B. Air. Will the proposal result in:			
1. Air emissions which would substantially deteriorate ambient air quality? Proposed community/recreational use only. No significant air emissions would not occur.	___	___	X
2. The exposure of sensitive receptors to substantial pollutant concentrations? No such concentrations on or near site; surrounding.	___	___	X
3. The creation of objectionable odors? Odors could occur; need mature control SEE DISCUSSION.	___	X	___
4. The creation of dust? The potential for short-term dust only to occur during construction - not significant.	___	___	X

		YES	MAYBE	NO
5.	Any alteration of air movement in the area of the project? One-story recreational bldg. Air movement would not be altered.	___	___	X
6.	A substantial alteration in moisture, or temperature, or any change in climate, either locally or regionally? No climate changes would result from this project.	___	___	X

C. Hydrology/Water Quality. Will the proposal result in:

1.	Changes in currents, or the course or direction of water movements, in either marine or fresh waters? All development outside of floodplain.	___	___	X
2.	Changes in absorption rates, drainage patterns, or the rate and amount of surface runoff? Potential significant changes to drainage or runoff could occur; require runoff/water quality controls. SEE DISCUSSION.	X	___	___
3.	Alterations to the course or flow of flood waters? SEE C1.	___	___	X
4.	Discharge into surface or ground waters, or in any alteration of surface or ground water quality, including, but not limited to temperature, dissolved oxygen or turbidity? Recreational/equestrian uses only on 12-acre site. Possible use of on-site septic system for all wastewater from public bathrooms and kitchen; revised project includes initial capture/treatment of all site runoff. SEE DISCUSSION.	___	X	___
5.	Discharge into surface or ground waters, significant amounts of pesticides, herbicides, fertilizers, gas, oil, or other noxious chemicals? Recreational/equestrian uses only. Such substances not expected be discharged in significant amounts, into surface or ground water.	___	___	X

	YES	MAYBE	NO
6. Change in deposition or erosion of beach sands, or changes in siltation, deposition or erosion which may modify the channel of a river or stream or the bed of the ocean or any bay, inlet or lake? Project site drains into the San Diego River - less than one-quarter mile south of the project site. See D4.	___	X	___
7. Exposure of people or property to water related hazards such as flooding? Proposed development not within 100-yr floodplain; proposed development site east of 100-year floodplain of adjoining drainage.	___	___	X
8. Change in the amount of surface water in any water body? Not applicable.	___	___	X

D. Biology. Will the proposal result in:

1. A reduction in the number of any unique, rare, endangered, sensitive, or fully protected species of plants or animals? SEE DISCUSSION and attached Biological Resources Survey report. Site contains non-native grasslands and adjoins endangered least Bell's vireo mitigation land and MHPA.	X	___	___
2. A substantial change in the diversity of any species of animals or plants? No substantial change would occur.	___	___	X
3. Introduction of invasive species of plants into the area? No invasive plant species would be introduced; consistent w/MSCP Adjacency Guidelines.	___	___	X

		YES	MAYBE	NO
4.	Interference with the movement of any resident or migratory fish or wildlife species? No interference with wildlife movement expected to occur.	___	___	X
5.	An impact on a sensitive habitat, including, but not limited to streamside vegetation, oak woodland, vernal pools, coastal salt marsh, lagoon, wetland, or coastal sage scrub or chaparral? SEE DISCUSSION; SEE D1.	___	X	___
6.	Deterioration of existing fish or wildlife habitat? SEE DISCUSSION; SEE D1.	___	X	___

E. Noise. Will the proposal result in:

1.	A significant increase in the existing ambient noise levels? Potential increase to the existing noise level during site grading and/or facilities construction could occur; potential adverse effects on adjoining areas containing endangered species; mitigation required. SEE DISCUSSION.	X	___	___
2.	Exposure of people to noise levels which exceed the City's adopted noise ordinance? Site within regional park; no adverse noise effects on human residences.	___	___	X
3.	Exposure of people to current or future transportation noise levels which exceed standards established in the Transportation Element of the General Plan? SEE E2.	___	___	X

	YES	MAYBE	NO
F. Light, Glare and Shading. Will the proposal result in:			
1. Substantial light or glare? No substantial lighting proposed; proposed day use only; required MHPA adjacency guidelines adherrance.	___	___	X
2. Substantial shading of other properties? Project would not shade other properties.	___	___	X
G. Land Use. Will the proposal result in:			
1. A land use which is inconsistent with the adopted community plan land use designation for the site? The proposed recreational development is consistent with park plan and adopted MSCP subarea plan. SEE DISCUSSION.	___	___	X
2. A conflict with the goals, objectives and recommendations of the community plan in which it is located? SEE G1 & DISCUSSION.	___	___	X
3. A conflict with adopted environmental plans for the area? SEE G1 & DISCUSSION.	___	___	X
4. Land uses which are not compatible with aircraft accident potential as defined by a SANDAG Airport Land Use Plan (ALUP)? Site not subject to an ALUP.	___	___	X

		YES	MAYBE	NO
H.	Natural Resources. Will the proposal result in:			
	1. The prevention of future extraction of sand and gravel resources? The proposal is a recreational use in a regional park; the proposed relatively minor improvements would not adversely effect sand or gravel resources if future extraction becomes a critical need.	___	___	X
	2. The conversion of agricultural land to nonagricultural use or impairment of the agricultural productivity of agricultural land? See H1.	___	___	X
I.	Recreational Resources: Will the proposal result in an impact upon the quality or quantity of existing recreational opportunities? The proposed improvemants affords new/improved recreational opportunities in a regional park.	___	___	X
J.	Population. Will the proposal alter the planned location, distribution, density, or growth rate of the population of an area? Proposed recreational use within a existing regional park, would not significantly alter the location, density or growth of the surrounding population.	___	___	X
K.	Housing. Will the proposal affect existing housing in the community, or create a demand for additional housing? Project would not affect existing or future housing. See J.	___	___	X

Mission Trails Regional Park
Multi-use Staging Area Project
Biological Technical Report

TABLE OF CONTENTS

TABLE OF CONTENTS (cont.)

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

This report has been prepared by HELIX Environmental Planning, Inc. (HELIX) to describe existing biological conditions for the multi-use staging facility project site within Mission Trails Regional Park, located in the City of San Diego, California. This report provides the public, City of San Diego, U.S. Fish and Wildlife Service (USFWS), and California Department of Fish and Game (CDFG) with information necessary to assess project impacts to biological resources under each agency's jurisdiction. Regulatory act(s)/plan(s) that apply to project development include the California Environmental Quality Act, the City of San Diego's Multiple Species Conservation Program (MSCP) and Environmentally Sensitive Lands Regulations, and state and federal Endangered Species Acts.

The site is located in eastern San Diego in the northeast portion of Mission Trails Regional Park. State Route 52 provides the north and east borders of the project site, and a Caltrans mitigation site forms the southern border of the project site. The site is within the City of San Diego's MSCP and is partially within the Multi-Habitat Planning Area (MHPA) of the MSCP. Surrounding land use consists of Mission Trails Regional Park land to the west, a Caltrans mitigation site to the south, and SR-52 to the east and north.

The proposed project involves developing a multi-use staging area in order to provide parking for and access to the hiking, biking, picnic, and equestrian areas available in Mission Trails Regional Park. Proposed parking consists of a multi-use parking lot, horse trailer parking, and bicycle racks. New facilities for equestrian activities include a horse washdown area, periodic horse rental and day-use horse corrals, a pony facility, hitching posts, and a manure storage area. In addition, the proposed development includes picnic areas, a park maintenance facility, public restrooms, a kitchen, a trail map kiosk, trails, and a drinking fountain. Development would be supported by a drainage system, connections to storm drains and the sewer, security lighting and a park sign. Landscaping includes use of native plant materials indigenous to Mission Trails Regional Park.

Prior to conducting biological field surveys, HELIX reviewed existing documents for projects in the vicinity of the project site and conducted an in-house database search for sensitive species known to occur within the project vicinity. A general biological survey, rare plant survey, vegetation mapping, and general zoology survey were conducted.

The sensitive habitats that occur on or adjacent to the project site are riparian woodland, southern willow scrub, mule fat scrub, juncus meadow, sycamore trees, Diegan coastal sage scrub, broom baccharis scrub and native and non-native grassland. A total of eight road pools (disturbed basins) that would water during winter/spring rains were observed along the dirt road adjacent to the Caltrans mitigation site. No sensitive plant species were observed on site during HELIX surveys. However, the federal proposed endangered San Diego ambrosia was previously observed within the project site and is included in the report. Three shoots of this plant were observed near the dirt road, east of the easterly drainage on the project site by a Park Ranger and later confirmed by Dudek.

Ten sensitive animal species were observed within the project or surrounding area during the HELIX survey: one reptile (orange-throated whiptail, *Cnemidophorus hyperythrus beldingi*), eight birds (white-tailed kite, *Elanus leucurus*; red-shouldered hawk, *Buteo lineatus*; turkey vulture, *Cathartes aura*; yellow warbler, *Dendroica petechia*; yellow-breasted chat, *Icteria virens*; Southern California rufous-crowned sparrow, *Aimophila ruficeps canescens*; grasshopper sparrow, *Ammodramus savannarum*; least Bell's vireo, *Vireo bellii pusillus*) and one mammal (San Diego black-tailed jackrabbit, *Lepus californicus bennettii*).

The project site includes two drainages that lead to canyons north of SR-52 that serve as wildlife corridors. The western canyon is a continuous wildlife corridor with access to open space to the north. While SR-52 bridges over the western drainage, this roadway interrupts the eastern drainage to the north of the project site, and as a result, the wildlife corridor function of the easterly drainage is limited.

Proposed development will border this eastern drainage. A Caltrans riparian habitat mitigation site borders the project site to the south, separated by a dirt roadway used by SDG&E for maintenance vehicle access and by Park Rangers.

The MSCP Subarea Plan identifies a Multi-Habitat Planning Area (MHPA) that is intended to link all core biological areas into a regional wildlife preserve. The Subarea Plan includes an equestrian center for Mission Trails Park that will occupy up to approximately 30 to 40 acres. MHPA guidelines for this future project describe the boundary of the proposed site as a conceptual location only that may be adjusted in order to minimize disturbance to adjacent land uses and biological resources. The MSCP Subarea Plan (City of San Diego 1997) includes specific management policies and directives that pertain to the subject property. These are to (1) "limit future equestrian trails to specified trails which minimize trail edge disturbances and are no greater than 25 percent gradient and (2) incorporate adequate setbacks into future plans to develop an equestrian center near the San Diego River to minimize impacts associated with cowbird parasitism, and establish a cowbird trapping program to minimize effects on the least Bell's vireo and other songbirds." Other MSCP policies that pertain to the project are discussed in the report, including MSCP Adjacency Guidelines.

The proposed location of the multi-use staging area has been sited to intrude into the Mission Trails Park open space areas as little as possible. The staging area is located at the eastern edge of the open space, in close proximity to the existing paved main access point. Proposed development would directly impact approximately 11.77 acres, including 0.37 acre of Diegan coastal sage scrub, 0.30 acre of disturbed Diegan coastal sage scrub, 0.41 acre of disturbed broom baccharis scrub, 10.00 acres of non-native grassland, and 0.69 acre of disturbed habitat. Impacts to Diegan coastal sage scrub, broom baccharis scrub, and non-native grassland are all considered significant and would require mitigation per the MSCP requirements.

The project would have a significant direct impact to the small population (three shoots) of San Diego ambrosia located in the approximate center of the development. The impact to this population is unavoidable due to its location. There would be cumulative impacts to raptor hunting habitats (coastal sage scrub subtypes, native and non-native grassland, primarily). Although raptor nests are found on site, no nests would be directly impacted by potential development. None of the federal, state, or narrow endemic listed plant and animal species with potential to occur on site are expected to occur because appropriate conditions for these species do not occur within the development footprint.

The proposed multi-use staging area will provide access for equestrian riders, bikers and hikers to the existing trail system located in Mission Trails Park. There are a number of dirt trails and roads that already exist in the park, and no new trails are anticipated. Direct impacts to the majority of sensitive habitats have been avoided by the proposed project design. However, there is the potential for inadvertent grading impacts to mule fat scrub in two locations and native grassland west of the northern extent of the project grading due to the proximity of the project to these habitats.

Another potential indirect effect associated with the project is construction noise impacts to coastal California gnatcatchers (should they occur) in the adjacent MHPA. These effects would be considered significant where construction occurs within 500 feet of an active gnatcatcher nest during the breeding season. The Caltrans mitigation site to the south of the project site may contain nesting least Bell's vireos. If project grading were to occur within the breeding season of the least Bell's vireo (March 15 to September 15), then significant impacts to this species from construction noise and disturbance may result. A non-occupied raptor nest was observed in a sycamore tree west of the project site development. Nesting raptors are protected by the Migratory Bird Treaty Act, and impacts to nesting activities would be considered significant.

Urban runoff from the project in the form of petroleum products on parking lots, sedimentation, manure and fertilizer could have a significant indirect impact on adjacent wetland areas. However, the project

grading and drainage plan have been specifically designed to address water quality issues. The project as designed is considered to meet the City's adjacency guidelines for water quality and the impact to water quality is not considered significant.

The introduction of an equestrian center near the San Diego River and the Caltrans mitigation site has the potential to increase possible nest parasitism by the brown-headed cowbird. Cowbirds are known to be attracted to areas with manure, and any increase in the presence of these birds could have significant impacts on nesting least Bell's vireos. Other potential indirect impacts addressed in the report include lighting, human intrusion, and landscaping. The project is located adjacent to a drainage corridor on the west with large sycamore trees, and a Caltrans riparian mitigation site located to the south. The report concludes that the project would not have significant impacts to the function and values of these wetland habitats if the required mitigation measures are implemented.

As noted above, the introduction of additional equestrian users, bikers, and hikers will not result in construction of new trails, but will increase the use of existing trails. The Park Rangers do not currently provide for removal of manure from trails used by equestrians. However, indirect impacts from potential cowbird infestation owing to possible increase in equestrian use, as well as that impact on water quality runoff (particularly in the stream just west of the facility) could be significant. In that case, staff would provide for manure removal as part of the maintenance tasks associated with this project.

The City's MSCP Subarea Plan reserved a 30 to 40 acre for future development of an equestrian center. The location of this "reserved area," shown on SanGIS maps, actually totals about 31.6 acres. Based on the existing MHPA mapping, the project would impact 2.2 acres of MHPA-designated land and 9.6 acres of non-MHPA land. During the siting studies for the multi-use staging area, consideration was given to siting the facility further to the west, however it would encroach further into the park and come closer to the significant north-south wildlife corridor that connects to open space north of SR-52 via a bridge structure. The project has been reduced in size from 30-40 potential acres to only 11.8 acres, and has been sited on the edge of the park outside of sensitive wetland habitat areas. The project location is compatible with the MHPA configuration and planned location for the facility. A total of 6.46 acres would be added to the MHPA, with 2.2 acres being removed. An MHPA boundary adjustment analysis is provided within the report.

Impacts to Diegan coastal sage scrub (including disturbed) and broom baccharis scrub for the project site would require 0.67 and 0.41 acres of Tier I – III habitats, respectively. Non-native grassland impacts would require 5.0 acre of Tier I – III habitats, for a total of 6.08 acres of mitigation located within the MHPA. The proposed MHPA boundary adjustment will add 6.5 acres of land located within the area originally set aside in the MSCP Subarea Plan for the staging area project that will be used to mitigate for the impact to 6.08 acres.

The direct impact to the known location of three shoots of San Diego ambrosia requires implementation of a transplantation program. The proposed location for the mitigation area is the existing San Diego ambrosia mitigation site located west of the Caltrans mitigation site. The three shoots of San Diego ambrosia will be transplanted to the established mitigation site and monitored for three years.

Mitigation measures required to reduce potential indirect impacts to below a level of significance include:

- Precision mapping of mule fat scrub along the western border of the site grading to ensure that final design avoids impacts to adjacent wetlands.
- Avoidance and/or mitigation of indirect impacts to breeding least Bell's vireo, coastal California gnatcatchers and raptors in sensitive adjacent habitats.

- Enforcement of manure clean up rules and implementation of an ongoing cowbird trapping program.
- Use of low intensity lighting and shielding to avoid lighting impacts.
- Use of signage, fencing and landscaping to direct people away from sensitive habitat areas.
- Trail maintenance to avoid cowbird proliferation and water quality impacts.

1.0 INTRODUCTION

This report has been prepared by HELIX Environmental Planning, Inc. (HELIX) to describe existing biological conditions for the multi-use staging facility project site within Mission Trails Regional Park, located in the City of San Diego, California. This report provides the public, City of San Diego, U.S. Fish and Wildlife Service (USFWS), and California Department of Fish and Game (CDFG) with information necessary to assess project impacts to biological resources under each agency's jurisdiction. Regulatory act(s)/plan(s) that apply to project development include the California Environmental Quality Act, the City of San Diego's Multiple Species Conservation Program (MSCP) and Environmentally Sensitive Lands Regulations, and state and federal Endangered Species Acts.

1.1 LOCATION

The site is located in eastern San Diego in the northeast portion of Mission Trails Regional Park (Figures 1 and 2). State Route 52 provides the north and east borders of the project site and divides Mission Trails Regional Park from East Elliot and Miramar Marine Corps Air Station to the north. The City of Santee lies to the east, and a Caltrans mitigation site forms the southern border of the project site. The site is within the City of San Diego's MSCP and is partially within the Multi-Habitat Planning Area (MHPA) of the MSCP.

1.2 PHYSICAL DESCRIPTION AND LAND USE

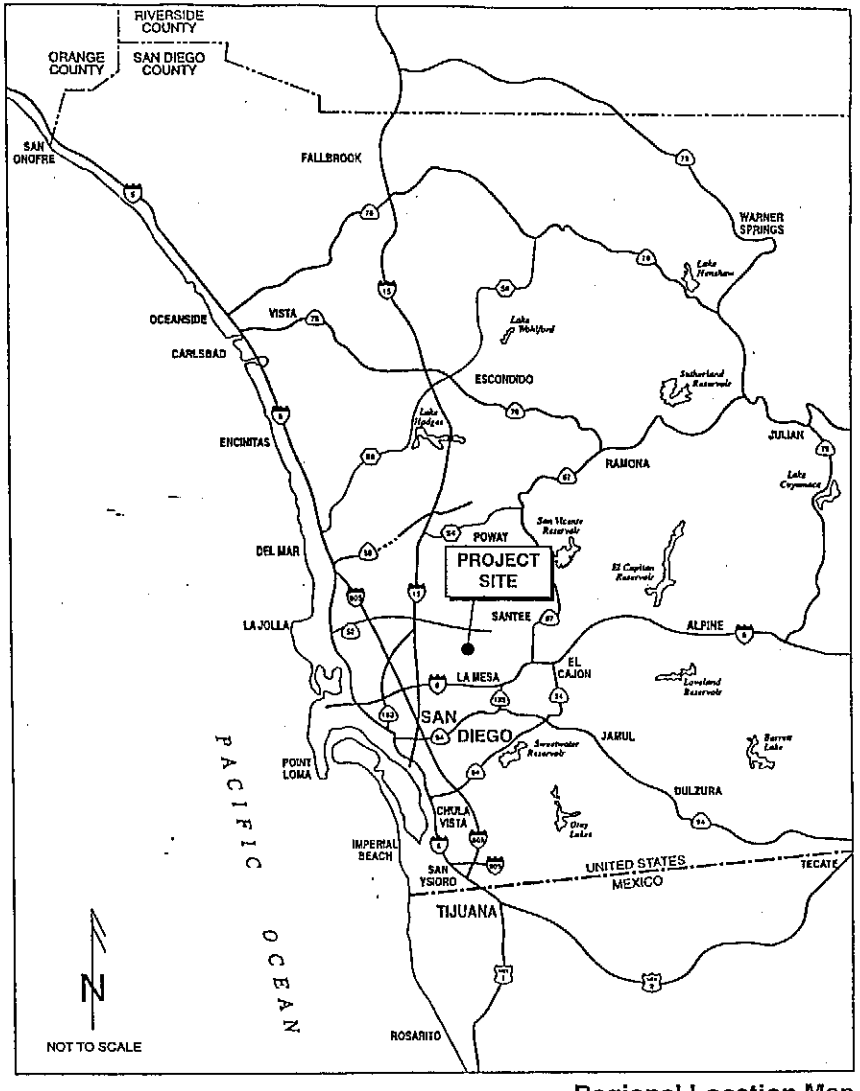
The site slopes gradually to the southwest. There are two north-south drainages that lead to canyons north of the study area: west of the study area and the other within the study area. The western drainage/canyon is a continuous wildlife corridor with access to open space to the north via a bridge below State Route 52 (SR-52). The eastern drainage closer to the proposed development is interrupted by SR-52 to the north of the project site and as a result is limited in its function as a wildlife corridor. The vegetation on site consists primarily of Diegan coastal sage scrub and non-native grassland, with other vegetation types such as mule fat scrub, sycamore trees, native grassland, and juncus meadow occurring mostly in the eastern drainage area. Patches of baccharis scrub also cover a large area in the south and central portion of the site. Existing dirt roads cross the study area. Surrounding land use consists of Mission Trails Regional Park land to the west, a Caltrans mitigation site to the south, and SR-52 to the east and north. Miramar Marine Corps Air Station and open space areas of East Elliot occur north of SR-52. Elevation on the site ranges from approximately 305 to 535 feet above mean sea level.

1.3 SOILS

Soil types on and near the site are diablo clay, diablo-olivenhain complex soils, redding cobbly loam dissected soils, stony land, and visalia gravelly sandy loam (Bowman 1973). The eastern drainage is comprised of stony land. To the east of the drainage are diablo clay to the north and diablo-olivenhain complex soils and visalia gravelly sandy loam to the south. West of the drainage and the proposed project site are diablo-olivenhain complex and redding cobbly loam dissected soils to the north, and visalia gravelly sandy loam to the south.

1.4 PROJECT DESCRIPTION

The proposed project involves developing a multi-use staging area in order to provide parking for and access to the hiking, biking, picnic, and equestrian areas available in Mission Trails Regional Park (Figure 3). The project concept was included in the City's MSCP. Consistency of the project with MSCP policies is discussed later in this report. Proposed parking consists of a multi-use parking lot, horse trailer parking, and bicycle racks. New facilities for equestrian activities include a horse washdown area, periodic horse rental and day-use horse corrals, a pony facility, hitching posts, and a manure storage



Regional Location Map

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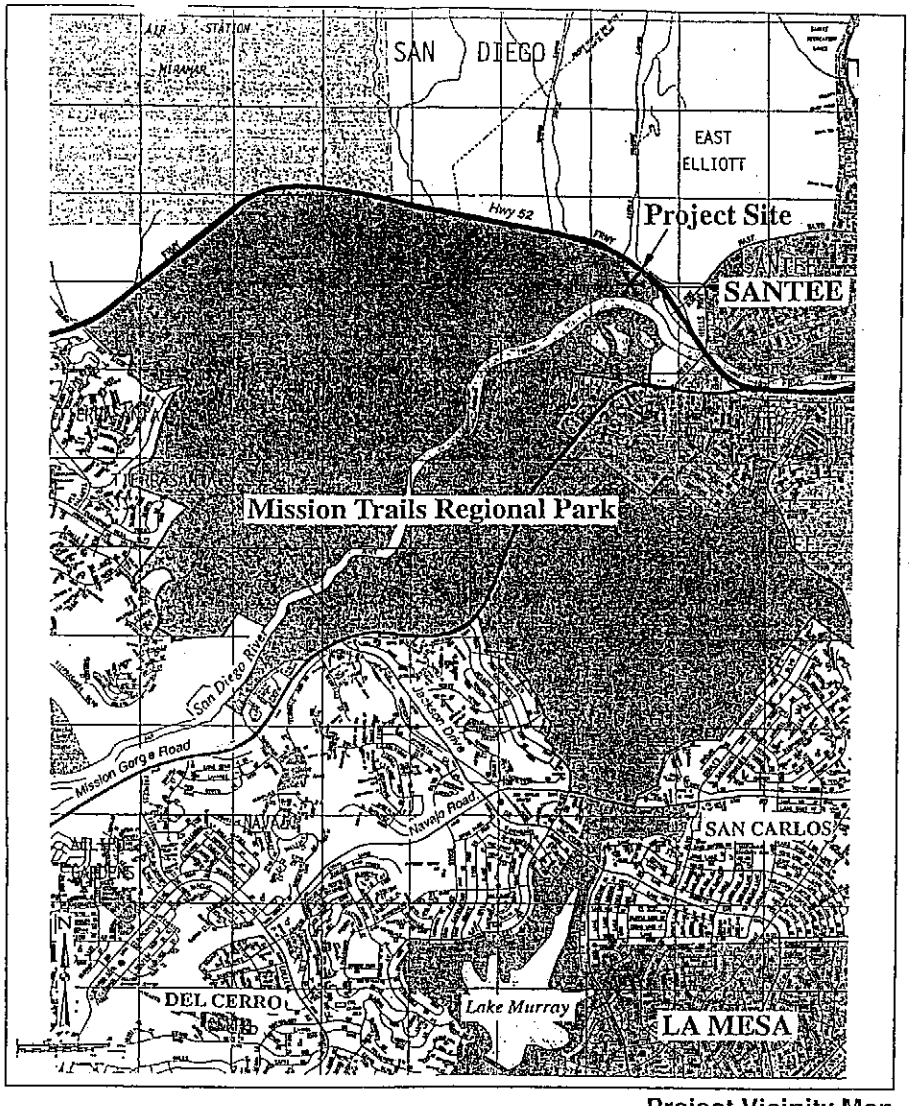
MISSION TRAILS PARK - MULTI-USE STAGING AREA

Figure 1



Project Vicinity Map
MISSION TRAILS PARK - MULTI-USE STAGING AREA
Figure 2

HELIX

area. In addition, the proposed development includes picnic areas, a park maintenance facility, public restrooms, a kitchen, a trail map kiosk, trails, and a drinking fountain. Development would be supported by a drainage system, connections to storm drains and the sewer, security lighting and a park sign. Landscaping includes use of native plant materials indigenous to Mission Trails Regional Park. No improvements to trails west of the project are proposed.

2.0 METHODS

Prior to conducting the biological field surveys (Appendix A), HELIX reviewed existing documents for projects in the vicinity of the project site and conducted an in-house database search for sensitive species known to occur within the project vicinity. A general biological survey and a rare plant survey were conducted by Tom Huffman and Fred Sproul on May 21, 1999. Vegetation mapping was started on this date and completed by Tom Huffman on June 1, 1999. A general zoology survey was conducted by Debbie Pudoff on June 25, 1999. An additional vegetation map survey was conducted by Tom Huffman on April 9, 2001. No focused animal surveys were undertaken. The May 1999 survey consisted of vegetation mapping and mapping of sensitive plant and animal resources observed during this survey. Plant and animal species observed during both surveys were noted and are presented in Appendices B and C of this report. Plant communities were mapped by HELIX based primarily on MSCP classifications (City of San Diego 1997). Rare plant surveys were conducted at the appropriate time of year for all potentially occurring sensitive plant species. Results of these surveys were mapped on a 1"=100' scale topographic map. A 1"=200' aerial photograph was used to assist with vegetation mapping. A previous siting of San Diego ambrosia (*Ambrosia pumila*) by DUDEK & Associates was not visible during HELIX surveys, but is included in this report.

Nomenclature for this report is from Hickman ed. (1993) for plants; Holland (1986) for vegetation communities; Collins (1997) for reptiles and amphibians; the American Ornithologists' Union (1998, as updated) for birds; and Jones *et al.* (1992) for mammals. Sensitive animal and plant status is taken from CDFG (1999a) and CDFG (1999b), respectively, as updated. Sensitive plant species habitats and blooming periods were determined from Skinner and Pavlik (1994).

3.0 RESULTS

The following results are discussed in terms of vegetation communities, plants, and animals.

3.1 VEGETATION COMMUNITIES

The project supports two types of disturbed areas and nine vegetation communities: riparian woodland, southern willow scrub, mule fat scrub, juncus meadow, sycamore trees, Diegan coastal sage scrub, broom baccharis scrub, native grassland, and non-native grassland (Table 1 and Figure 4). The study area for which vegetation mapping was conducted is shown on Figure 4. The wildlife surveys also included observations made beyond the vegetation mapping area.

3.1.1 Riparian Woodland

Southern riparian woodlands and forests are composed of winter-deciduous trees that require water near the soil surface. Willow (*Salix* sp.) and cottonwood (*Populus* sp.) trees form a dense medium height woodland or forest in the drainage bottoms. Associated understory species include mule fat (*Baccharis salicifolin*), stinging nettle (*Urtica dioica* ssp. *holosericea*) and wild grape (*Vitis girdiana*; Beauchamp 1986). The riparian woodland south of the study area is located within a 70-acre riparian habitat mitigation area constructed by Caltrans as part of the SR-52 project approximately seven years ago.

HELIX

Table 1
SUMMARY OF VEGETATION COMMUNITIES/HABITATS ON OR ADJACENT TO THE SITE

VEGETATION COMMUNITIES/HABITATS		ACREAGE
Wetland Habitats		
Riparian Woodland		N/A*
Southern Willow Scrub		0.04
Mule Fat Scrub		0.93
Juncus Meadow		0.60
Sycamore Trees		0.78
TOTAL WETLAND		2.35
Upland Habitats	TIER	ACREAGE
Diegan Coastal Sage Scrub	II	3.73
Diegan Coastal Sage Scrub – Disturbed	II	12.72
Broom Baccharis Scrub	II	5.42
Broom Baccharis Scrub - Disturbed	II	0.41
Native Grassland	I	2.34
Non-native Grassland	III B	17.96
TOTAL UPLAND		42.58
Other	TIER	ACREAGE
Disturbed Basin		0.04
Disturbed Habitat	IV	1.63
TOTAL OTHER		1.67
GRAND TOTAL		46.60

*Located south of the study area.

3.1.2 Southern Willow Scrub

Southern willow scrub consists of dense, broadleaved, winter-deciduous stands of trees dominated by shrubby willows in association with mule fat. This habitat occurs on loose, sandy or fine gravelly alluvium deposited near stream channels during flood flows. The herbaceous understory consists of: Curly dock (*Rumex crispus*), cocklebur (*Xanthium strumarium* var. *canadense*) and western ragweed (*Ambrosia psilostachyn*). Though floristically very similar to southern willow riparian woodlands, there are differences in physiognomy: southern willow scrub lacks a tree stratum and the lower shrub stratum has higher cover and density values. Frequent flooding maintains this early seral community, preventing succession to a riparian woodland or forest (Holland 1986). In the absence of periodic flooding, competition between the willows will intensify as these individuals grow and resources become more scarce. A small percentage of these individuals will survive and form the tree stratum, while most will die or exist as suppressed juveniles in the lower stratum. On this site, the southern willow scrub occurs along the north-south drainage that bisects the study area (Figure 4). Approximately 0.04 acre of southern willow scrub habitat occurs on site.

3.1.3 Mule Fat Scrub

Mule fat scrub is a depauperate, tall, herbaceous, riparian scrub community dominated by mule fat and interspersed with shrubby willows. This habitat occurs along intermittent stream channels with a fairly coarse substrate and moderate depth to the water table. Similar to southern willow scrub, this early seral community is maintained by frequent flooding, the absence of which would lead to a riparian woodland or forest (Holland 1986). Approximately 0.94 acre of mule fat scrub habitat occurs along the central drainage on site and along the drainage in the western portion of the study area.

3.1.4 Juncus Meadow

Juncus meadow is a vegetation category used to describe grassland composed of a higher percentage of rush species (*Juncus sp.*) than in the native grassland or non-native grassland vegetation types. On this site, the two rush species found were mariposa rush (*Juncus dubius*) and iris-leaved rush (*Juncus xiphioides*), and the dominant grass species was Italian ryegrass (*Lolium multiflorum*). Approximately 0.60 acre of juncus meadow habitat occurs on site.

3.1.5 Sycamore Trees

This vegetation type is characterized by sparse western sycamore trees (*Platanus racemosa*) and an understory of mostly non-native grasses. On this site, dominant species are ripgut grass (*Bromus diandrus*), mule fat, rush, curly dock, wild radish (*Raphanus sativus*), and ambrosia. On this site, sycamore trees are interspersed throughout the drainage within the study area. Approximately 0.78 acre of sycamore tree habitat occurs on site.

3.1.6 Diegan Coastal Sage Scrub

Coastal sage scrub is one of the two major shrub types in California and may be dominated by a variety of species throughout its range. Distribution of the various plant species within the coastal sage scrub communities on site is dependent on slope, aspect, and soil type. The Diegan coastal sage scrub on the project site falls into three different subassociations. The habitat in the southern portion of the site is located on a south-facing slope and the vegetation is moderately dense, about 3 to 4 feet in height. Dominant species include California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), black sage (*Salvia mellifera*), lemonadeberry (*Rhus integrifolia*), and coast encelia (*Encelia californica*). On the central, mesa top portion of the site, the habitat is sparser and includes a larger percentage of open areas dominated by non-native grassland species. Dominant species include primarily California sagebrush, California buckwheat, and sparse non-native grassland species. The Diegan coastal sage scrub located on the north-facing slopes in the northern portion of the site includes dense, more diverse vegetation (ranging from 4 to 10 feet in height) dominated by lemonadeberry, toyon (*Heteromeles arbutifolia*), laurel sumac (*Rhus laurina*), and yellow bush monkeyflower (*Mimulus aurantiacus*). Approximately 16.45 acres of Diegan coastal sage scrub habitat occur on site, 12.72 acres of which are disturbed.

3.1.7 Broom Baccharis Scrub

Broom baccharis scrub is a subassociation of coastal sage scrub. This community is comprised primarily of broom baccharis (*Baccharis sarothroides*). This habitat often occurs in flood plains and other areas with periodic disturbance. Approximately 5.83 acres of broom baccharis scrub habitat occur on site, 0.41 acre of which is disturbed.

3.1.8 Native Grassland

Native grassland is a community dominated by perennial bunchgrasses such as purple needle grass (*Achnatherum pulchra*) with annual and perennial forbs such as common golden stars (*Bloomeria crocea* ssp. *Crocea*) and California blue-eyed grass (*Sisyrinchium bellum*). Native grasslands generally occur on fine-textured soils that generally exclude the annual, exotic grasses. Almost all of the native grasslands in California have been displaced by non-native grassland dominated by introduced annual species. Native grasslands occur throughout California as small isolated islands. On this site, a major area of native grassland occurs on the slope west of the drainage, and in a smaller patch east of the drainage. Approximately 2.34 acres of native grassland habitat occur on site.

3.1.9 Non-native Grassland

Non-native grassland is a dense to sparse cover of annual grasses, often associated with numerous species of showy-flowered native annual forbs. This association occurs on gradual slopes with deep, fine-textured, usually clay soils. Predominant species on site include oats (*Avena* sp.), red brome (*Bromus rubens*), ripgut, ryegrass, and black mustard (*Brassica nigra*). Most of the annual introduced species that compromise the majority of species and biomass within the non-native grassland originated from the Mediterranean region an area with a long history of agriculture and a climate similar to California. These two factors, in addition to intensive grazing and agricultural practices in conjunction with severe droughts, contributed to the successful invasion and establishment of these species and the replacement of native grasslands with an annual dominated non-native grassland (Jackson 1985). Approximately 17.96 acres of non-native grassland occur on site.

3.1.10 Disturbed

Disturbed areas are either barren of vegetation or are dominated by non-native weedy species that are adapted to a regime of frequent disturbance. On the project site, the two unpaved roadways running approximately west to east through and bordering the project site are considered disturbed habitat. In addition, a small basin (apparently man-made) on the west of the project site is disturbed. Disturbed areas were mostly devoid of any vegetation. Approximately 1.67 acres of disturbed areas occur on site. Other habitat types exist on site with some degree of disturbance.

3.1.11 Road Pools

A series of road pools were observed along the dirt road that runs along the north boundary of the Caltrans mitigation site (Figure 4). These basins have resulted in the dirt road likely as a result of the vehicular use of the road (compacting of the soil). The basins have no evidence of vernal pools or wetland vegetation. Road pools or water holding basins are routinely mapped as part of biological surveys because, in some areas, they have potential to support the endangered San Diego fairy shrimp (*Branchinecta sandiegonensis*).

3.2 PLANTS

A full list of plant species observed on the project site is included in Appendix B.

3.3 ANIMALS

A complete list of animal species observed within the project site is presented in Appendix C.

4.0 SENSITIVE RESOURCES

This section provides a discussion of sensitive vegetation, plants, and animals that occur within the study area.

4.1 SENSITIVE HABITATS

Sensitive habitats are those that are considered rare within the region, are considered sensitive by CDFG (Holland 1986), are listed as sensitive under the MSCP (City of San Diego 1997), the City of San Diego's Biology Guidelines (1998b), or support sensitive plants or animals. The sensitive habitats that occur on the project site are riparian woodland, southern willow scrub, mule fat scrub, juncus meadow, sycamore trees, Diegan coastal sage scrub, broom baccharis scrub, native grassland, and non-native grassland. Upland habitat Tier ratings are provided in Table 1.

4.2 SENSITIVE PLANT SPECIES

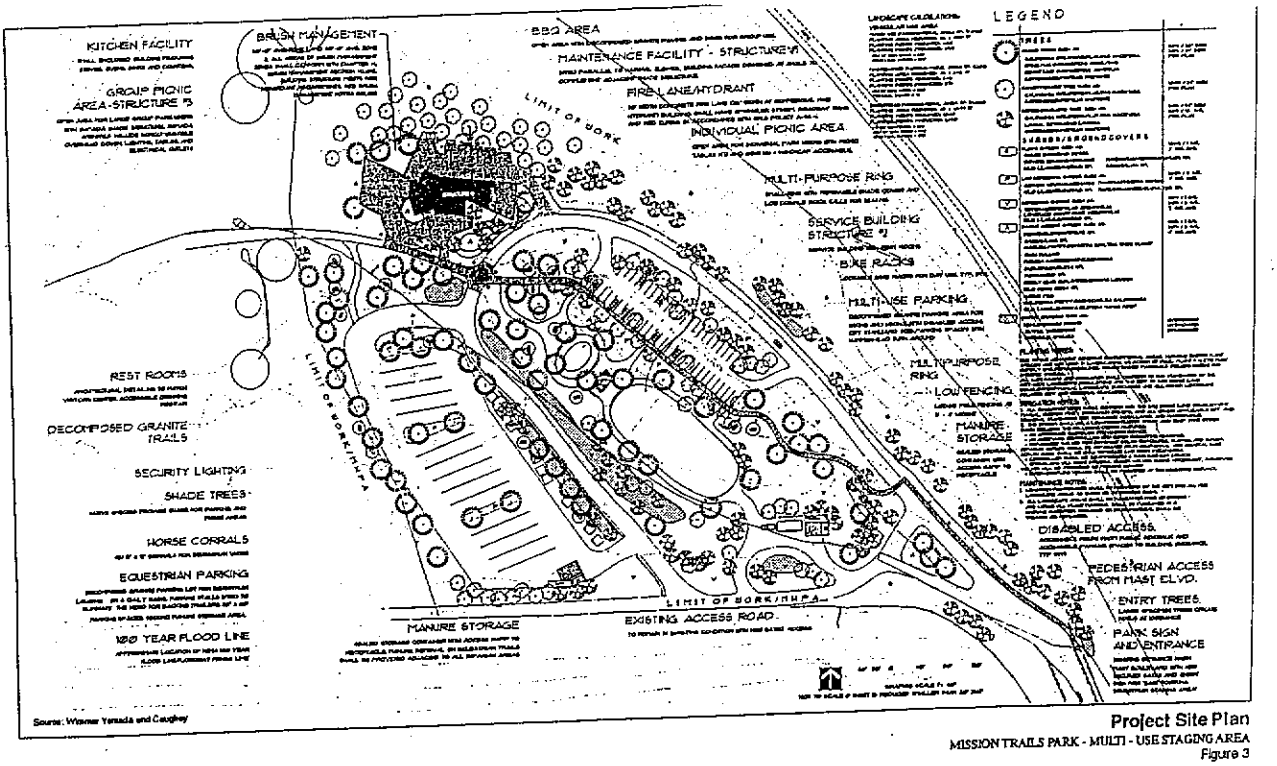
No sensitive plant species were observed on site during HELIX surveys. However, San Diego ambrosia was previously observed within the project site and is discussed below.

San Diego ambrosia (*Ambrosia pumila*)
Status: Proposed Federal Endangered; CNPS List 1B; R-E-D 3-3-2
Distribution: San Diego County, Riverside County, Baja California, Mexico.
Habitat(s): Chaparral, coastal sage scrub, valley and foothill grasslands, vernal pools. Often in disturbed areas.
Status on site: Several significant populations are known to occur within Mission Trails Regional Park. A San Diego ambrosia management plan (DUDEK 2000) notes that the park is home to the second largest population of San Diego ambrosia known to exist within the United States. Three shoots of this plant were observed near the dirt road, east of the easterly drainage on the project site (Figure 4) by a Park Ranger and later confirmed by DUDEK. This species was not visible during surveys by HELIX even though a search for the individuals was made by HELIX staff during the rare plant survey (San Diego ambrosia were confirmed to be observable at other known populations on the same day as the survey). The San Diego ambrosia location on site was mapped using GPS technology and transferred digitally to HELIX maps for this report.

Plant species (other than narrow endemics) that were not observed at the time of HELIX's survey but may have the potential to occur on site are listed in Table 2. Table 3 provides a discussion of the potential to occur for all the City of San Diego's listed narrow endemic species.

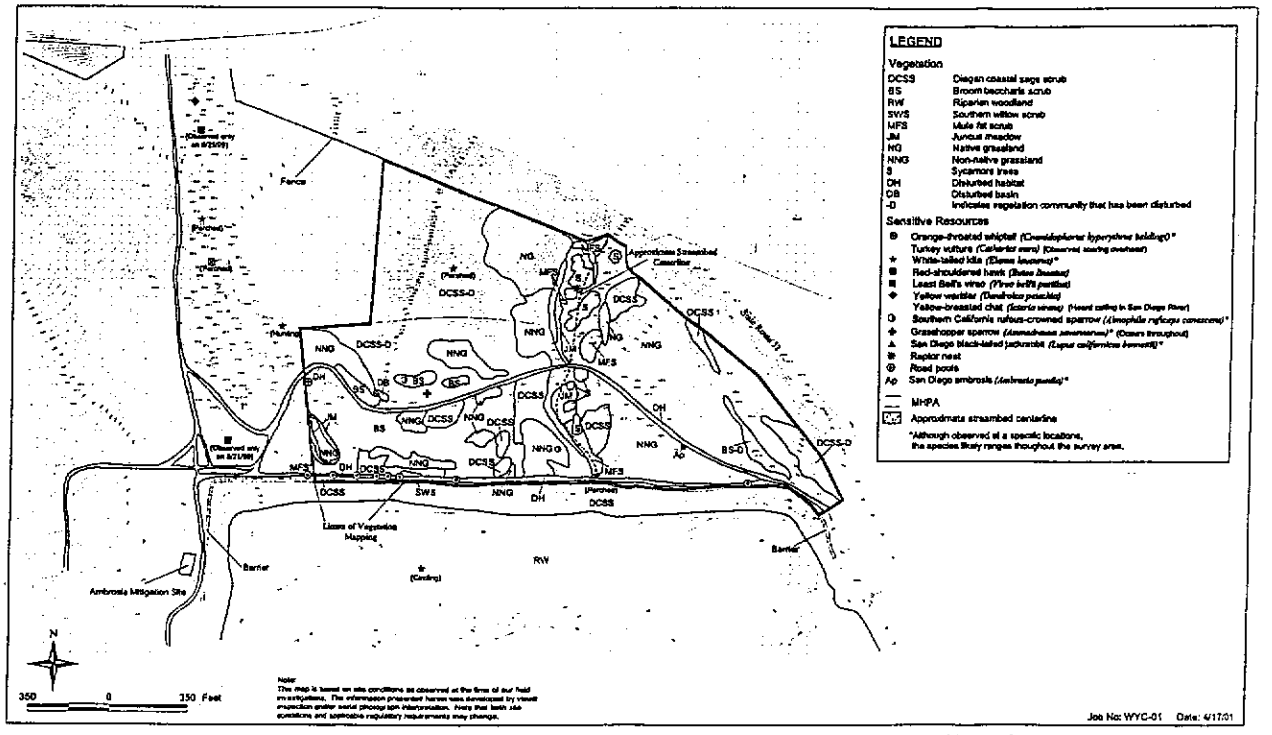
Table 2
LISTED OR SENSITIVE PLANT SPECIES WITH POTENTIAL TO OCCUR ON SITE

SPECIES	STATUS*	POTENTIAL TO OCCUR
San Diego county needlegrass (*Achnathurum diegoense*)	CNPS List 4 R-E-D 1-2-1	Low potential to occur. Often found in more wet areas in chaparral and coastal sage scrub and on clay slopes.
White coast ceanothus (*Ceanothus verrucosus*)	CNPS List 2 R-E-D 1-2-1	Low. Shrub occurring in chaparral. Would have been observed if present.
Summer holly (*Comarostaphylos diversifolia*)	CNPS List 1B R-E-D 2-2-2	Low. Shrub occurring in chaparral. Would have been observed if present.



Project Site Plan
MISSION TRAILS PARK - MULTI - USE STAGING AREA
Figure 3

HELIX



Vegetation and Sensitive Resources
MISSION TRAILS PARK - MULTI-USE STAGING FACILITY
Figure 4

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Table 2 (cont.)

SPECIES	STATUS*	POTENTIAL TO OCCUR
Orcutt's bird-beak (*Cordylanthus orcuttianus*)	RS/– CNPS List 2 R-E-D 3-3-1	Coastal sage scrub.
Del Mar sand aster (*Corethrogyne filaginifolia* var. *linifolia*)	CNPS List 1B R-E-D 3-2-3	Low. Perennial herb occurring in chaparral and coastal sage scrub. Would have been observed if present.
Western dichondra (*Dichondra occidentalis*)	CNPS List 4 R-E-D 1-2-1	Low to moderate. Perennial herb occurring in chaparral, coastal sage scrub, and valley and foothill grasslands. May occur in dense Diegan coastal sage scrub, especially after fire events.
Orcutt's dudleya (*Dudleya attenuata* ssp. *orcuttii*)	RS/-- CNPS List 2 R-E-D 3-3-1	Low. Coastal bluff scrub, chaparral, and coastal sage scrub.
Short-leaved dudleya (*Dudleya blochmaniae* ssp. *brevifolia*)	CDFG SE CNPS List 1B R-E-D 3-3-3	Low. Perennial herb occurring in chaparral or coastal sage scrub. Not expected on site because the soils are sandy loam and altamont clay, rather than the Torrey sandstone preferred by this species.
San Diego barrel cactus (*Ferocactus viridescens*)	FSC/- CNPS List 2 R-E-D 1-3-1	Moderate. Dry slopes in coastal sage scrub. May occur on slope west of central drainage. Does not occur east of drainage.
Palmer's grapplinghook (*Harpagonella palmeri*)	RS/-- CNPS List 2 R-E-D 1-2-1	Low. Clay soils in chaparral, coastal sage scrub, and grasslands.
Cleveland's goldenstars (*Muilla clevelandii*)	CNPS List 1B R-E-D 2-2-2	Low. Perennial herb occurring in chaparral, coastal sage scrub, valley and foothill grasslands, and vernal pools. Would have been observed if present.
Nuttall's scrub oak (*Quercus dumosa*)	FSC/- CNPS List 1B R-E-D 2-3-2	Chaparral with sandy or clay loam soils. Would have been observed if present.
Munz's sage (*Salvia munzii*)	RS/– CNPS List 1B R-E-D 3-3-2	Low potential to occur in chaparral.
Ashy spike-moss (*Selaginella cinerascens*)	-/- CNPS List 4 R-E-D 1-2-1	Flat mesas in coastal sage scrub and chaparral. Likely occurs in open areas on site.
Parry's tetracoccus (*Tetracoccus dioicus*)	RS/–, CNPS List 1B R-E-D 3-3-2	Low potential to occur in chaparral.

*Explanation of listing/sensitivity can be found in Appendix D.

Table 3
NARROW ENDEMIC PLANT SPECIES WITH THE POTENTIAL TO OCCUR

SPECIES	STATUS*	POTENTIAL TO OCCUR
San Diego thornmint (*Acanthomintha ilicifolia*)	FT/CE CNPS List 1B R-E-D 2-3-2	Occurs on clay lenses in open areas. Low potential to occur on site in the grassland within clay soil. Would have been observed if present.
Shaw's agave (*Agave shawii*)	RS/– CNPS List 2 R-E-D 3-3-1	Coastal sage scrub and coastal bluff scrub. Would have been detected if present.
Aphanisma (*Aphanisma blitoides*)	RS/– CNPS List 1B R-E-D 2-2-2	Very low potential to occur on site. No known populations in MSCP Plan Area.
Coastal dunes milk vetch (*Astragalus tener* var. *titi*)	PE/CE CNPS List 1B R-E-D 3-3-3	Occurs in sandy places along the coast. No potential to occur on site.
Short-leaved live-forever (*Dudleya blochmaniae* ssp. *brevifolia*)	CE CNPS List 1B R-E-D 3-3-3 MSCP Narrow Endemic	No potential to occur. Occurs on dry, sandstone bluffs in chamise chaparral. Not expected due to lack of appropriate habitat.
Variegated dudleya (*Dudleya variegata*)	RS/– CNPS List 1B R-E-D 2-2-2	Occurs on dry hillside and mesas. Low potential to occur on site, and would have been detected if present.
Otay tarplant (*Hemizonia conjugens*)	FT/CE CNPS List 1B R-E-D 2-3-2	Occurs from Sweetwater Reservoir area south to the Mexican border. No potential to occur on site.
Prostrate navarretia (*Navarretia fossalis*)	FT/- CNPS List 3-3-2 R-E-D 2-3-2	Vernal pool species with limited number of populations. No potential to occur on site due to lack of habitat.
Snake cholla (*Opuntia parryi* var. *serpentina*)	RS/- CNPS List 1B R-E-D 3-3-2	Chaparral and coastal sage scrub from Point Loma south to Chula Vista and Baja California. No potential to occur on site.
California orcutt grass (*Orcuttia californica*)	FE/CE CNPS List 1B R-E-D 3-3-2	Vernal pool species. No potential to occur on site due to lack of habitat.
San Diego mesa mint (*Pogogyne abramsii*)	FE/CE CNPS List 1B R-E-D. 2-3-3	Vernal pool species. No potential to occur on site due to lack of habitat.
Otay Mesa mint (*Pogogyne nudiuscula*)	FE/CE CNPS List 1B R-E-D 3-3-2	Otay Mesa vernal pool species. No potential to occur on site.

*Explanation of listing/sensitivity can be found in Appendix D.

4.3 SENSITIVE ANIMAL SPECIES

Ten sensitive animal species were observed during the HELIX survey: 1 reptile (orange-throated whiptail, *Cnemidophorus hyperythrus beldingi*), 8 birds (white-tailed kite, *Elanus leucurus;* red-shouldered hawk, *Buteo lineatus;* turkey vulture, *Cathartes aura;* yellow warbler, *Dendroica petechia;* yellow-breasted

chat, *Icteria virens*; Southern California rufous-crowned sparrow, *Aimophila ruficeps canescens*; grasshopper sparrow, *Ammodramus savannarum*; least Bell's vireo, *Vireo bellii pusillus*), and 1 mammal (San Diego black-tailed jackrabbit, *Lepus californicus bennetii*).

Orange-throated whiptail (*Cnemidophorus hyperythrus beldingi*)
Status: Regionally Sensitive/CDFG CSC
Distribution: Southern Orange County and southern San Bernardino County (Colton), south to the cape of Baja California, Mexico.
Habitat(s): Coastal sage scrub, chaparral, edges of riparian woodlands, and washes. Also found in weedy, disturbed areas adjacent to these habitats. Important habitat requirements include open, sunny areas, shaded areas, and abundant invertebrate prey base, particularly termites (*Reticulitermes* sp.).
Status on site: An orange-throated whiptail was observed west of the study area in non-native grassland near the dirt road. This species likely forages in other habitat types in the survey area.

White-tailed kite (*Elanus leucurus*)
Status: Nesting – CDFG Special Animal
Distribution: Breeds in the Pacific U.S. Winters to South America as far south as Chile.
Habitat(s): Nesting typically occurs in riparian or oak woodlands adjacent to grasslands where small mammals are hunted.
Status on site: White-tailed kites were observed hunting and perched throughout the survey area.

Red-shouldered hawk (*Buteo lineatus*)
Status: Blue List 1972-1986 (Tate 1986)
Distribution: A breeding resident in the western U.S. (California and northern Baja California, Mexico). Populations from the eastern U.S. winter in the southwestern U.S. and northern Mexico.
Habitat(s): Open woodlands, grasslands and agricultural fields. Prefers mature eucalyptus stands, oak woodlands, and riparian forests.
Status on site: A red-shouldered hawk was observed perched on southern willow scrub west of the project site, but likely travels throughout the survey area.

Turkey vulture (*Cathartes aura*)
Status: San Diego County Species of Concern (Everett 1979)
Distribution: Much of the U.S. and southern Canada. Some individuals are migratory.
Habitat(s): Nests are made on ledged, rock outcrops and in tall trees.
Status on site: A turkey vulture was observed foraging and likely uses habitats throughout the survey area.

Yellow warbler (*Dendroica petechia brewsteri*)
Status: CDFG CSC
Distribution: Throughout North America. A spring and summer breeding resident in southern California.
Habitat(s): Riparian areas throughout California. Primarily restricted to riparian woodland and riparian scrub habitats in southern California.
Status on site: One yellow warbler was observed in coastal sage scrub habitat west of the proposed development, although it is not restricted to this habitat type or location.

Yellow-breasted chat (*Icteria virens*)
Status: CDFG CSC
Distribution: Most of North America. Breeds in southern California during the spring and summer.
Habitat(s): Brushy tangles, briars, stream thickets, riparian scrub, and riparian woodland. Breeding confined to riparian woodlands.
Status on site: A yellow-breasted chat was observed in the river running through the Caltrans mitigation site; however, it likely ranges over a variety of habitat types on site.

Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*)
Status: Regionally Sensitive/CDFG CSC
Distribution: Ventura County southeast through Los Angeles, Orange, Riverside and San Diego counties to northwestern Baja California, Mexico.
Habitat(s): Coastal sage scrub where it occurs on rocky hillsides and in canyons but also may be found in open sage scrub/grassy areas of successional growth for example, after a fire.
Status on site: Two Southern California rufous-crowned sparrows were observed in non-native grassland and baccharis scrub habitats west of the proposed development, although they likely forage on grassland and sage scrub habitat types throughout the survey area.

Grasshopper sparrow (*Ammodramus savannarum*)
Status: San Diego County Species of Concern (Everett 1979)
Distribution: Southern Canada to the southern U.S., West Indies, and Mexico to Ecuador.
Habitat(s): Grassland habitat that usually has a mix of coastal sage scrub species.
Status on site: One grasshopper sparrow was observed in Diegan coastal sage scrub habitat west of the proposed development in the first survey, but was observed throughout the site during a second visit.

Least Bell's vireo (*Vireo bellii pusillus*)
Status: USFWS FE/CDFG SE
Distribution: Formerly common and widespread in California and northwestern Baja California, Mexico. Known to winter only in southern Baja California, Mexico.
Habitat(s): Riparian woodland and is most frequent in areas that combine an understory of dense, young willows (Salix spp.) or mule fat (Baccharis salicifolia) with a canopy of tall willows.
Status on site: Least Bell's vireos were observed in southern willow scrub habitat and in tamarisk trees west of the project site but likely use riparian areas throughout the site.

San Diego black-tailed jackrabbit (*Lepus californicus bennettii*)
Status: Regionally Sensitive/CDFG CSC
Distribution: Southern Santa Barbara County, south on the coastal slope to the vicinity of San Quintin, Baja California, Mexico. Localities on the eastern edge of its range include Jacumba and San Felipe Valley in San Diego County.
Habitat(s): Occurs primarily in open habitats including coastal sage scrub, chaparral, grasslands, croplands, and open, disturbed areas if there is at least some shrub cover present.
Status on site: San Diego black-tailed jackrabbit scat was observed in disturbed basin and non-native grassland habitats throughout the site.

In addition to these animals observed on site, several sensitive animal species have the potential to occur within the project boundaries (Table 4). Focused surveys for a majority of these species are generally not warranted because of their low level of sensitivity or for other reasons provided below.

Table 4
LISTED OR SENSITIVE ANIMAL SPECIES WITH POTENTIAL TO OCCUR

SPECIES	STATUS*	POTENTIAL TO OCCUR
Insects		
Hermes copper (*Lycaena hermes*)	USFWS RS	Moderate; food plant (*Rhamnus crocea*) found in Diegan coastal sage scrub. Focused surveys for this species are not warranted due to its low sensitivity.
Quino checkerspot butterfly (*Euphydryas editha quino*)	USFWS E	Low; no stands of the larval host plants (*Plantago erecta*) or owl's clover were observed. No surveys are necessary under City requirements, and the site is located outside the year 2000 USFWS recommended protocol survey area. This species is not covered under the MSCP.
San Diego fairy shrimp (*Branchinecta sandiegonensis*)	USFWS E	Very Low. This species may occur in the one road pool within the development area, or the other 7 basins west of the project area. Potential for occurrence is considered very low due to lack of vernal pool habitat in the immediate vicinity and the recent man-made origination of the basins (basins occur in road built after Caltrans mitigation site was installed approximately eight years ago).
Reptiles		
San Diego horned lizard (*Phrynosoma coronatum blainvillii*)	USFWS RS CDFG CSC	High; food source (harvester ants [*Pogonomyrmex* sp.]) not seen but probably present; chaparral, coastal sage scrub. Focused surveys for this species are not warranted due to its low sensitivity. This species was evaluated by the MSCP and found to be adequately conserved.
Coastal whiptail (*Cnemidophorus tigris multiscutatus*)	CDFG CSC	High; coastal sage scrub, chaparral, various woodlands. Focused surveys for this species are not warranted due to its low sensitivity.
Birds		
Coastal California gnatcatcher (*Polioptila californica californica*)	USFWS FT	Moderate. Habitat appropriate on site; focused surveys may be required prior to construction to determine presence/ absence of nesting birds if construction were to occur during the breeding season (February 15 to August 30).
Merlin (*Falco columbarius*)	CDFG CSC	High; fairly common visitor to coastal areas of San Diego County in winter. The site is limited to potential use as foraging habitat.

Table 4 (cont.)

SPECIES	STATUS*	POTENTIAL TO OCCUR
Birds (cont.)		
Northern harrier (*Circus cyaneus*)	CDFG CSC	Low; prefers grasslands and more open habitats.
California horned lark (*Eremophila alpestris actia*)	CDFG CSC	High; observed just off site on mesa.
Bell's sage sparrow (*Amphispiza belli belli*)	CDFG CSC	Moderate; found in site vicinity and habitat appropriate. Would likely have been detected if present.
Mammals		
Pallid bat (*Antrozous pallidus pacificus*)	CDFG CSC	Moderate; could forage throughout the site, but roosting sites are likely elsewhere. Focused surveys needed for detection but not warranted.
Greater western mastiff bat (*Eumops perotis californicus*)	CDFG CSC	Moderate; could forage in any habitat on site, but roosting sites are likely elsewhere. Focused surveys needed for detection but not warranted
Pacific little pocket mouse (*Perognathus longimembris pacificus*)	USFWS FE CDFG CSC	Low; occasionally found in coastal sage scrub, prefers sandy soils. Habitat appears not to be suitable on site (not sandy enough). Trapping necessary for detection but not warranted because habitat not suitable and site is not within potential range of the species.
Dulzura California pocket mouse (*Chaetodipus californicus femoralis*)	CDFG CSC	Low to moderate; dense chaparral, but occasionally other shrublands. Trapping necessary for detection but not warranted.
Northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*)	CDFG CSC	Low to moderate; coastal sage scrub and ruderal areas, often in sandy washes. Trapping necessary for detection but not warranted.
San Diego desert woodrat (*Neotoma lepida intermedia*)	CDFG CSC	Moderate; woodrat sign was found, but it could have been dusky-footed woodrat. Habitat is coastal sage scrub and other xeric habitats. Trapping necessary for detection but not warranted.
Southern grasshopper mouse (*Onychomys torridus ramona*)	CDFG CSC	Moderate; could occur in all arid habitats including all shrublands. Trapping necessary for detection but not warranted.

*Explanation of listing/sensitivity can be found in Appendix D.

5.0 REGIONAL AND REGULATORY CONTEXT

Locally, the significance of biological resources occurring within a project site are assessed based on the species' or habitats' importance to the region as a whole, relative quality, and degree of connection to larger open space or preservation areas.

5.1 HABITAT AND WILDLIFE CORRIDOR EVALUATION

One of the primary objectives of the Multiple Species Conservation Program (MSCP) is to maintain a preserve system which allows animals and plants to maintain their existence at both local and regional levels. This preserve system, called the Multi-Habitat Planning Area (MHPA) is a network composed of core biological resource areas (large blocks of habitat) and linkages/wildlife corridors.

The project site includes two drainages that lead to canyons north of SR-52 that serve as wildlife corridors. The western canyon is a continuous wildlife corridor with access to open space to the north. While SR-52 bridges over the western drainage, this roadway interrupts the eastern drainage to the north of the project site, and as a result, the wildlife corridor function of the easterly drainage is limited. Proposed development will border this eastern drainage. A Caltrans riparian habitat mitigation site borders the project site to the south, separated by a dirt roadway used by SDG&E for maintenance vehicle access and by Park Rangers.

5.2 MSCP EVALUATION

The City of San Diego's MSCP Subarea Plan has been prepared to meet the requirements of the California Natural Communities Conservation Planning (NCCP) Act of 1992. This Subarea Plan is consistent with the MSCP and describes how the City of San Diego's portion of the MSCP Preserve, the MHPA, will be implemented. This section provides a description of the MHPA in the study area as well as MSCP guidelines and directives (City of San Diego 1997) with which the proposed project must show consistency.

5.2.1 MHPA Preserve

The MSCP Subarea Plan (City of San Diego 1997) identifies a Multi-Habitat Planning Area (MHPA) that is intended to link all core biological areas into a regional wildlife preserve. Changes in the MHPA boundary are allowed as long as the biological function and value of the area to be added to the MHPA is equal to or greater than the function and value of the area to be deleted. The Subarea Plan includes an equestrian center for Mission Trails Park that will occupy up to approximately 30-40 acres. MHPA guidelines for this future project describe the boundary of the proposed site as a conceptual location only that may be adjusted in order to minimize disturbance to adjacent land uses and biological resources. The spatial relationship of the area reserved for a multi-use staging area in the MHPA, relative to the study area, is shown in Figure 4. The relationship of the proposed development plan with the MHPA is discussed later in this report.

5.2.2 MHPA Adjacency Guidelines

Within and adjacent to the MHPA, land uses are to be managed to ensure minimal impacts to the MHPA. Following is a summary of guidelines that are used to evaluate projects to determine consistency with the MSCP.

Drainage and Toxics: All parking lots and developed areas adjacent to reserved areas of the MHPA will not drain directly (without some form of treatment for water quality and erosion potential) into undeveloped areas of the MHPA, and the release of toxins, chemicals, petroleum products, exotic plant materials, and other harmful elements to these areas will be prevented.

Lighting: Lighting of all developed areas adjacent to reserved areas of the MHPA should be directed away from these areas, or development should provide adequate shielding with non-invasive (preferably native) plant materials, berms, or other measures.

Noise: Uses in or adjacent to reserved areas of the MHPA should be designed to minimize noise impacts. Berms or walls should be constructed adjacent to commercial areas, recreational areas, and any other use that may introduce noises that could impact or interfere with wildlife utilization of the MHPA. Excessively noisy uses or activities adjacent to breeding areas must incorporate noise reduction measures and be curtailed during the breeding season of sensitive species. Adequate noise reduction measures should also be incorporated for the remainder of the year.

Barriers: New development adjacent to or within the MHPA may be required to provide barriers along MHPA boundaries or boundaries between developed and pristine areas to direct public access.

Invasives: It is required that invasive plants not be introduced to areas adjacent to sensitive habitat areas.

5.2.3 Specific Management Directives

The MSCP Subarea Plan (City of San Diego 1997, page 74) includes specific management policies and directives that pertain to the subject property. These are to 1) "limit future equestrian trails to specified trails which minimize trail edge disturbances and are no greater than 25 percent gradient" and 2) "incorporate adequate setbacks into future plans to develop an equestrian center near the San Diego River to minimize impacts associated with cowbird parasitism, and establish a cowbird trapping program to minimize effects on the least Bell's vireo and other songbirds." Additionally, MHPA guidelines also generally describe the study area as the "potential location of a future 30-40 acre equestrian center and buffer. This is a conceptual location only and may be adjusted in order to minimize disturbance to adjacent land uses and biological resources."

In addition to specific directives for Mission Trails Park, general guidelines (Section 1.5.2 of the Subarea Plan) for public access trails and recreation are summarized below:

- Limit the extent and location of equestrian trails to the less sensitive areas of the MHPA. Locate staging areas for equestrian uses at a sufficient distance from sensitive areas to ensure biological values are not impaired.
- Trails should be limited in width and properly maintained to minimize erosion and avoid inadvertent impacts to sensitive habitats.
- Equestrian trails should be maintained on a regular basis to remove manure in order to control cowbird invasion and predation. Trails should be designed and maintained where possible to drain into a gravel bottom or vegetated swale or basin to detain runoff and remove pollutants.

An analysis of the proposed project's consistency with these management directives is provided in Section 6.2.

5.2.4 Special Conditions for Covered Species

Special conditions apply to certain covered species that would be impacted by a project. These species, primarily narrow endemics, require special mitigation measures. One such species, San Diego ambrosia, occurs within the project site. The MSCP requires that no more than 10% of the populations at Mission Trails Regional Park be impacted. A management plan for this species in Mission Trails Park was finalized on May 15, 2000 (DUDEK 2000). The federal and state endangered least Bell's vireo does occur to the south and west of the project site. Relative to this species, the MSCP requires that local jurisdictions must require new developments adjacent to preserve areas that create conditions attractive to brown-headed cowbirds to monitor and control cowbirds. The MSCP requires adequate buffers for development located adjacent to known populations. A third species, coastal California gnatcatcher, may occur in coastal sage scrub located in the study area. No other species requiring special management considerations are known or expected to occur on the Mission Trails Regional Park Multi-use Staging Area project site.

None of the other federal, state, or narrow endemic listed plant and animal species with potential to occur on site are expected to occur within the proposed development area because appropriate conditions for these species do not occur on site.

5.3 REGULATORY AGENCY PERMIT REQUIREMENTS

The U. S. Army Corps of Engineers (ACOE) regulates impacts to jurisdictional wetlands and Waters of the U. S. under Section 404 of the Clean Water Act. The California Department of Fish and Game (CDFG) regulates impacts to streambeds under Section 1603 of the Fish and Game Code. Sensitive biological resources are regulated by the Environmentally Sensitive Lands Regulations (City of San Diego 2000). Areas under the jurisdiction of the ACOE, CDFG and City of San Diego occur within the easterly drainage as non-wetland waters of the U.S., non-wetland streambeds, and wetlands.

6.0 IMPACTS

This section presents an impact analysis of the proposed Mission Trails Regional Park Multi-use Staging Area project site. Impacts are considered either direct or indirect. An impact is direct when the primary effects of a project replace existing habitat with graded or developed areas. An indirect impact consists of secondary effects of a project, including habitat insularization, edge effect, exotic species invasion, vehicular noise, and increased human or pet intrusion. The magnitude of an indirect impact can be the same as a direct impact, however the effect usually takes a longer time to become apparent.

Impacts to observed biological resources or those with potential to occur on site were determined to be adverse based upon the sensitivity of the resource and the extent of the anticipated impacts. For certain highly sensitive resources (for example, an endangered species) any impact would be perceived as adverse. Conversely, other resources that have a low regional sensitivity (for example, species with a large, locally stable population but declining elsewhere) could sustain a relatively large area of impact or population loss with minor impact.

6.1 DIRECT IMPACTS

6.1.1 Project Grading

The proposed location of the multi-use staging area has been sited to intrude into the Mission Trails Park open space areas as little as possible. The staging area is located at the eastern edge of the open space, in close proximity to the existing paved main access point. Proposed development would directly impact

approximately 11.78 acres, 0.37 acre of Diegan coastal sage scrub, 0.30 acre of disturbed Diegan coastal sage scrub, 0.41 acre of disturbed broom baccharis scrub, 10.00 acres of non-native grassland, and 0.69 acre of disturbed habitat (Table 5; Figure 5). Impacts to Diegan coastal sage scrub, broom baccharis scrub, and non-native grassland are all considered significant and would require mitigation per the MSCP requirements.

Table 5
DIRECT IMPACTS OF THE PROPOSED PROJECT

VEGETATION COMMUNITIES/HABITATS		EXISTING ACREAGE	IMPACTS
Native Habitats	Tier		
Riparian Woodland		-	-
Southern Willow Scrub		0.04	-
Mule Fat Scrub		0.88	-
Juncus Meadow		0.44	-
Sycamore Trees		0.78	-
Diegan Coastal Sage Scrub	II	3.17	0.37
Diegan Coastal Sage Scrub – Disturbed	II	12.44	0.30
Broom Baccharis Scrub	II	3.43	-
Broom Baccharis Scrub – Disturbed	II	0.41	0.41
Native Grassland	I	2.34	-
TOTAL NATIVE		23.93	1.08
Non-Native Habitats	Tier		
Non-native Grassland	III B	–	--
Disturbed	IV	1.96	0.69
TOTAL NON-NATIVE		18.77	10.69
TOTAL		42.70	11.77

The project would have a significant direct impact to the small population (three shoots) of San Diego ambrosia located in the approximate center of the development. The impact to this population is unavoidable due to its location. Given the size of the population, moving the equestrian center (to the west) and more into the core of the Park to avoid impacts is not warranted. Transplantation of this population is considered acceptable in the San Diego ambrosia management plan (DUDEK 2000).

There would be cumulative impacts to raptor hunting habitats (coastal sage scrub subtypes, native and non-native grassland, primarily). These impacts would be considered adverse, but not significant due to the relatively small amount of impact and low sensitivity of the impacted animal species that have the potential to occur on site. Although raptor nests are found on site, no nests would be directly impacted by potential development.

None of the federal, state, or narrow endemic listed plant and animal species with potential to occur on site is expected to occur because appropriate conditions for these species do not occur on site (Tables 2, 3, and 4). For example, potential direct impacts to the coastal California gnatcatcher are considered negligible because potential development occupies a small area and does not include habitat favored by the gnatcatcher. Similarly, the Quino checkerspot butterfly has very low potential to occur on site because no stands of the larval host plants were observed on site.

The project would directly impact only one of the 8 road pools that occur within the dirt road located immediately north of the Caltrans mitigation site. These basins are not regulated by City of San Diego wetland regulations due to the complete lack of wetland vegetation and the man-made origination of the basins. The potential for occurrence of San Diego fairy shrimp in the basin to be impacted is considered very low due to lack of vernal pool habitat in the immediate vicinity and the recent man-made origin of the basins. The road within which the basins occur was built when the Caltrans mitigation site was installed approximately 8 years ago. This area is not know to have supported vernal pool prior to the construction of SR 52 and the associated mitigation site. The Bauder Vernal Pool Study (1986) does not indicate presence of vernal pools in this area. Other reported sightings of low quality vernal pools in the western portion of Mission Trails Park are not located in close proximity to the project site. The impact to one of these pools is not considered significant because the potential for San Diego fairy shrimp to occur is considered very low given the lack of vernal pools in the immediate vicinity and the man-made nature of the basins.

6.1.2 Trail System

The proposed multi-use staging area will provide access for equestrian riders, bikers and hikers to the existing trail system located in Mission Trails Park (Figure 6). There are a number of dirt trails and roads that already exist in the park, and no new trails are anticipated. Park rangers escorted HELIX and City staff members on a tour of the park to look at the trails already present. Some trails with sensitive biological resources are limited to hiking only, and will continue to be. No significant direct impacts from trails are anticipated. Indirect impacts to trails are discussed in Section 6.2.3.

6.2 INDIRECT IMPACTS

6.2.1 Construction Impacts

Direct impacts to the majority of sensitive habitats have been avoided by the proposed project design. However, there is the potential for inadvertent grading impacts to mule fat scrub in two locations west of the northern extent of the project grading (Figure 5) due to the proximity of the project to this habitat. These impacts, which would be considered significant, can be mitigated by careful final design, and by monitoring of construction by a qualified biologist.

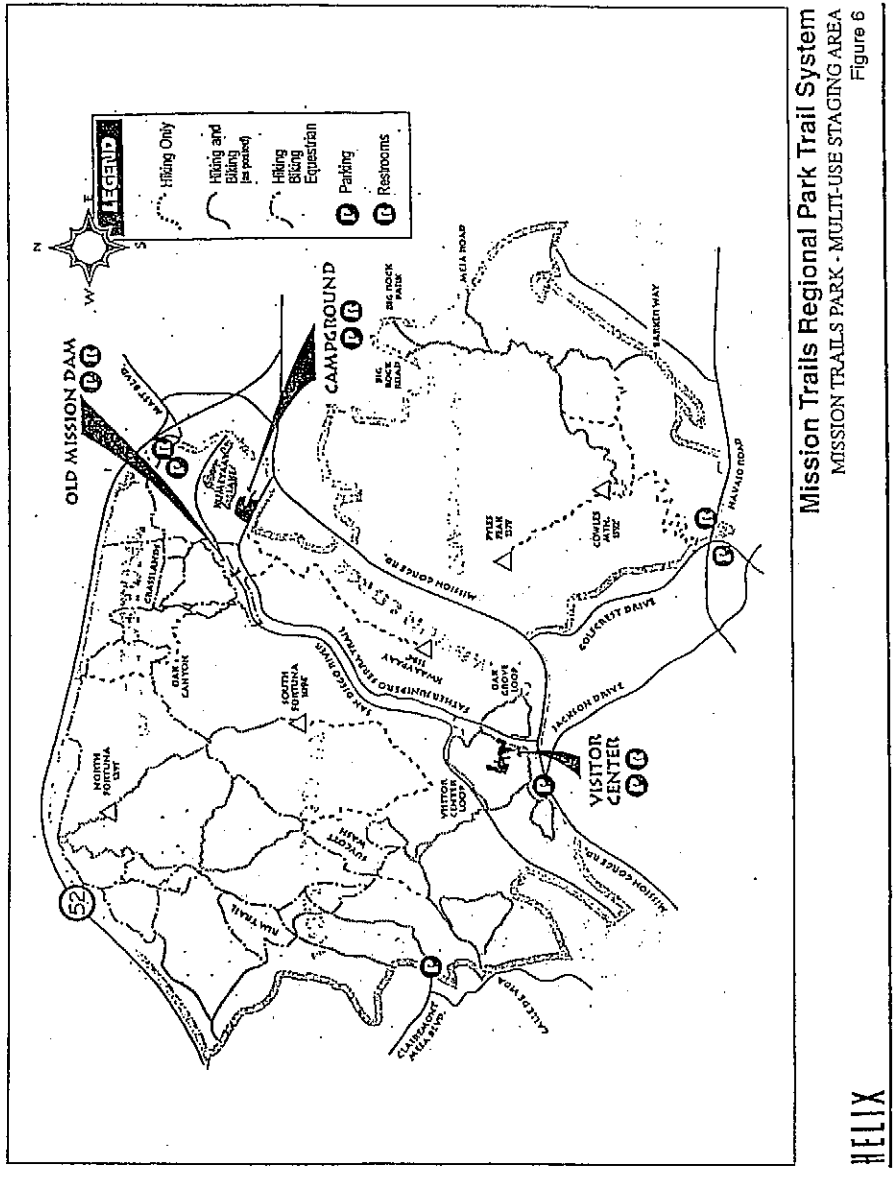
Another potential indirect effect associated with the project is construction noise impacts to coastal California gnatcatchers (should they occur) within this site. Development within or adjacent to MHPA occupied gnatcatcher habitat areas may not occur during the breeding season (between March 1 and August 15). If construction occurs during the breeding season, construction noise and dust in habitat on site may indirectly impact the coastal California gnatcatcher. These effects would be considered significant where construction occurs within 500 feet of an active gnatcatcher nest during the breeding season. Mitigation measures are described below.

The Caltrans mitigation site to the south of the project site may contain nesting least Bell's vireos. If project grading were to occur within the breeding season of the least Bell's vireo (March 15 to September 15), then significant impacts to this species from construction noise and disturbance may result.

As shown on Figure 5, a non-occupied raptor nest was observed in a sycamore tree west of the project site development. The potential exists for raptor species to be nesting on site during the time when most raptors breed (December to June). Nesting raptors are protected by the Migratory Bird Treaty Act, and impacts to nesting activities would be considered significant.

6.2.2 Operational Impacts

Water Quality: Urban runoff from the project, in the form of petroleum products on parking lots, sedimentation, manure and fertilizer, could have a significant impact on adjacent wetland areas. One concern for the development of this site is the potential for drainage to flow downslope into the Caltrans mitigation site south of the project site. In addition to the natural topographic differences between these two sites, the Caltrans mitigation area is lower in elevation relative to surrounding terrain. The other water quality concern is potential impacts to the drainage located west of the project site. The project grading and drainage plan (Figure 7) has been specifically designed to address water quality issues.



Mission Trails Regional Park Trail System
MISSION TRAILS PARK - MULTI-USE STAGING AREA
Figure 6

HELIX

Drainage that originates on the slope located north of the development will be routed around the development area via a graded ditch around the northern perimeter of the site (Figure 7). There are five grass-swale type detention basins on the site that will collect storm runoff and provide natural filtering before the water is sent via a storm drain to the drainage west of the site, and to the Caltrans preserve south of the site. Runoff from the parking lots has been designed to drain away from wetland areas and flow into these detention basins in order to provide water quality filtering. Energy dissipator structures (rip-rap) at the end of the storm drain outlets will ensure that erosion impacts will be minimized. Measures to reduce potential manure runoff impacts include manure storage, requirements that horse boarders and vendors remove their manure, and enforcement of these requirements by Park Rangers. The project as designed is considered to meet the City's adjacency guidelines for water quality and the impact to water quality is not considered significant.

Least Bell's Vireo: The introduction of an equestrian center near the San Diego River and the Caltrans mitigation site has the potential to increase possible nest parasitism by the brown-headed cowbird. Cowbirds are known to be attracted to areas with manure, and any increase in the presence of these birds could have significant impacts on nesting least Bell's vireos. One way to reduce the potential impact is to keep the corrals and staging area as clean as possible. The staging area will include requirements that equestrian users clean up after themselves, and the Park Rangers intend to enforce these requirements. The site plan includes manure storage areas so that the manure can be deposited and removed. The Park and Recreation Department has agreed to implement an ongoing cowbird trapping program. Implementation of these measures would reduce potentially significant impacts to below a level of significance.

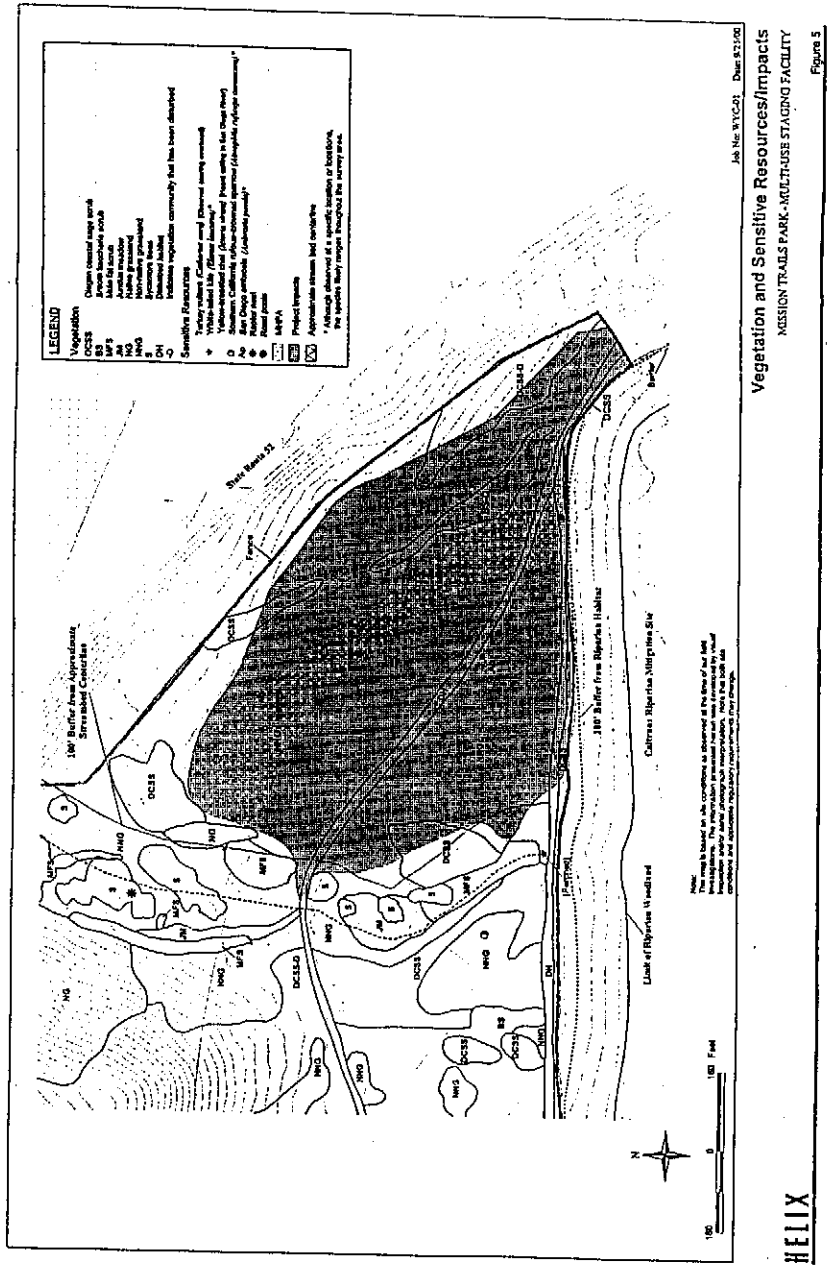
Lighting: The project has the potential to introduce lighting that could impact the adjacent wildlife habitats. The project site plan (Figure 3) includes parking areas, a maintenance facility and security lighting. These lights will be limited in intensity and designed to shine away from sensitive habitat areas.

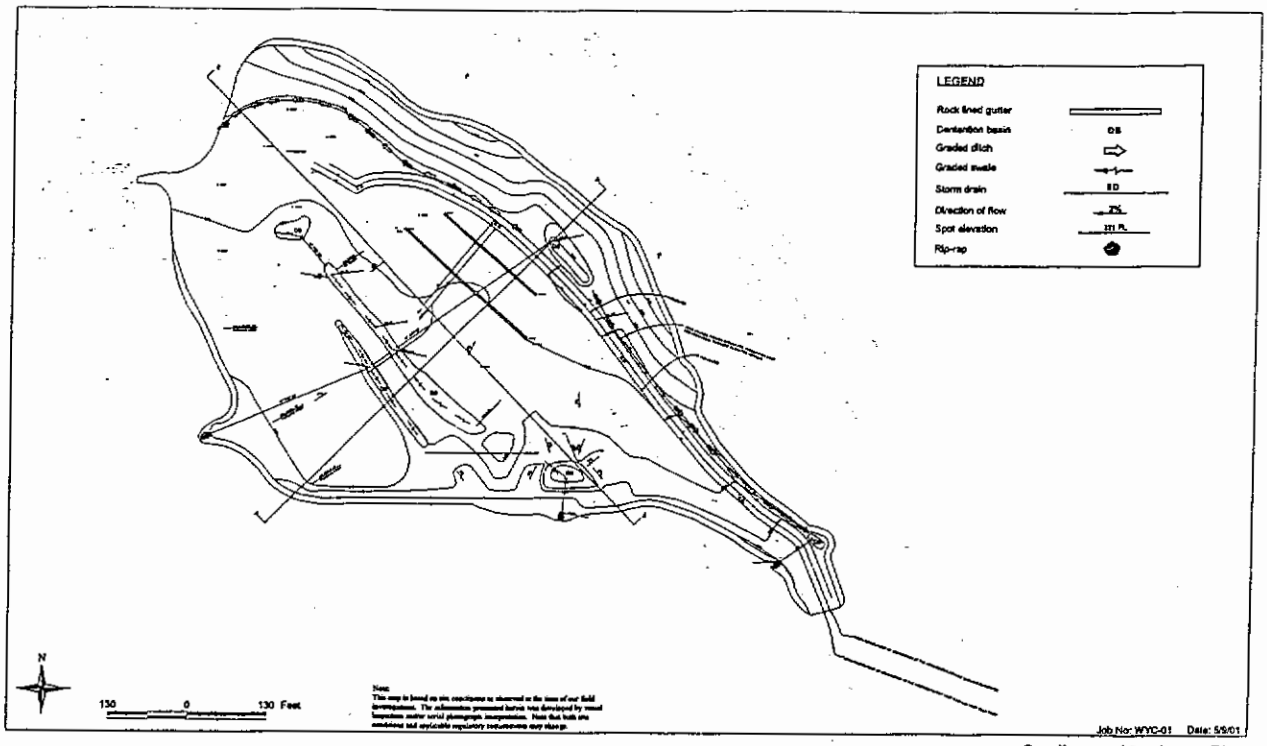
Human Intrusion: The project will introduce human activity into an area with sensitive habitats nearby, which could result in impacts to wildlife habitats.

Landscaping: The MSCP adjacency guidelines state that introduction of exotic species must be avoided. The project site plan (Figure 3) includes use of native plant material that will not result in introduction of exotic species. In addition, key areas of the project, such as the trailer parking lot in the western portion of the site, include use of native trees to help screen the parking lot from the Caltrans mitigation site and the drainage to the west. The use of native plant material has been very successfully used in other park improvements (Visitor's Center, Old Mission Dam parking lot, Old Mission dam viewing area, etc.) to minimize the impact of development on adjacent habitats.

Wetland Buffers: As discussed above, the project is located adjacent to a drainage corridor on the west with large sycamore trees, and a Caltrans riparian mitigation site located to the south. Indirect impacts to these habitat areas are analyzed in Sections 6.2.1 and 6.2.2 of this report. Figure 5 shows the distance of the project grading from the two wetland areas.

The easterly drainage contains large sycamore trees with mostly non-native grassland understory, and patches of juncus meadow habitat. A raptor nest was observed in a sycamore tree in the northern extent of the drainage. The cover is open in many areas, although patches of mule fat scrub and scattered willow trees in the southern extent provide additional cover. The function of this drainage as a major wildlife corridor is limited as a result of the construction of SR-52 to the north. The drainage and associated vegetation continues to provide significant localized wildlife habitat, but is not anticipated to result in movement of larger mammals. The drainage is located in a relatively flat, floodplain area and as result the stream likely moves from time to time, particularly in the northern extent. The approximate streambed centerline is shown on Figure 5. The project would provide a 100-foot buffer from the stream



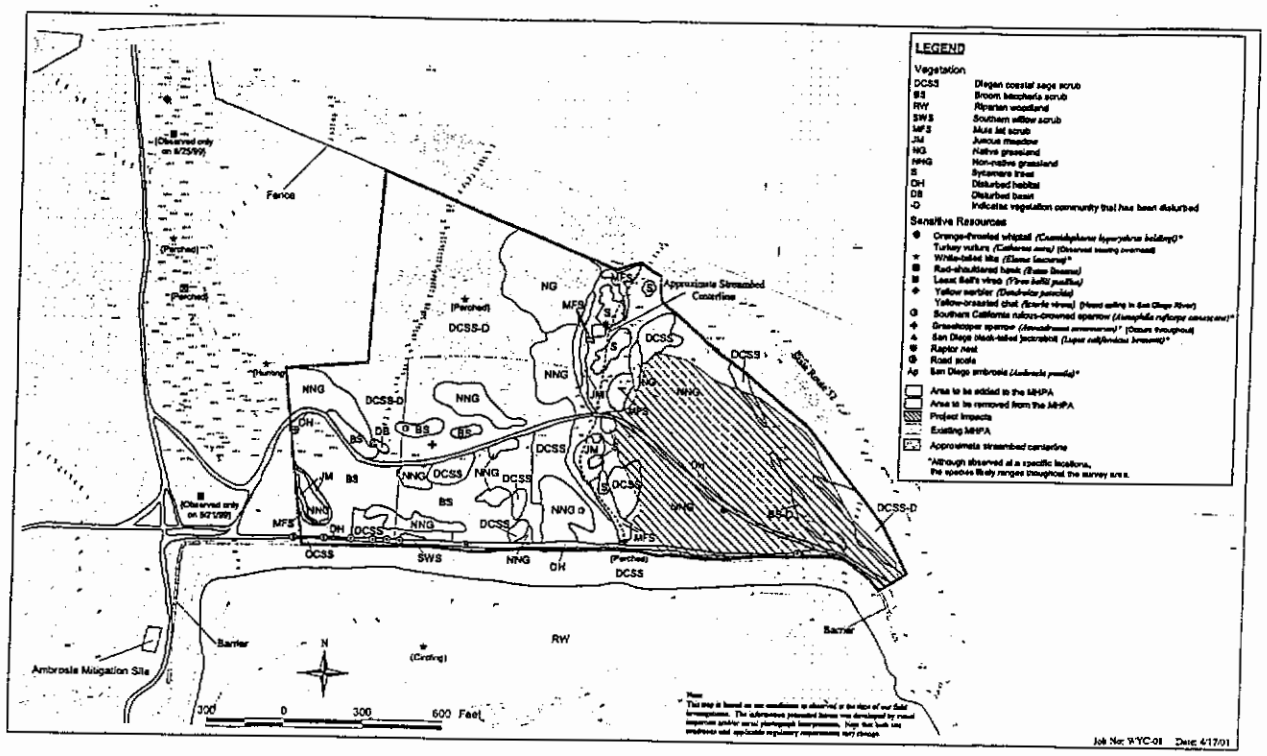


Grading and Drainage Plan

MISSION TRAILS PARK - MULTI-USE STAGING FACILITY

Figure 7

HELIX



Proposed MHPA Boundary Adjustment

MISSION TRAILS PARK - MULTI-USE STAGING FACILITY

Figure 8

HELIX

centerline for the majority of the project. There are 2 areas shown on Figure 5 where grading would encroach into the buffer. This encroachment would be temporary (with the exception of 2 drainage outfalls shown on Figure 7), and would be landscaped with native plant material. Permanent development (parking lots, maintenance facility, and group picnic area shown on Figure 3) are located outside the buffer area. Although the project introduces a development adjacent to the drainage area, the project is designed to be landscaped with native trees and plants, much like other parking areas in the park, which will help integrate it with the native habitat. The project, as designed, is considered to have a sufficient buffer to avoid impacting the function and value of the adjacent stream habitat.

The Caltrans mitigation site was constructed to provide riparian habitat and nesting habitat for the least Bell's vireo as mitigation for the construction impacts of SR-56. The habitat is dominated by large willow and cottonwood trees, and provides significant nesting habitat for riparian bird species. A 100-foot buffer will also be maintained from the riparian habitat located in the Caltrans mitigation site to the south. There is a significant grade difference (about 18-20 feet) between the proposed development and the riparian habitat, with a revegetated slope in between. There currently is a dirt road north of the Caltrans site and telephone pole barrier to prevent vehicular access. As shown in Figure 3, a short stretch of the future outbound access road for the facility will be located in the same location as part of the existing dirt road. The project site plan includes a dense concentration of large native tree plantings adjacent to the south of the equestrian parking lot, and use of native trees throughout the development. Potential adverse impacts from cowbird parasitism, water quality, night lighting and other issues are addressed above. The buffer provided by the project to the riparian habitat and the mitigation measures to address other impacts is considered adequate to prevent significant impacts to the functions and values of this habitat.

6.2.3 Trail System

As noted in Section 6.1.3, the introduction of additional equestrian users, bikers, and hikers will not result in construction of new trails, but will increase the use of existing trails. The Park Rangers do not currently provide for removal of manure from trails used by equestrians. However, indirect impacts from potential cowbird infestation owing to possible increase in equestrian use, as well as that impact on water quality runoff (particularly in the stream just west of the facility) could be significant. In that case, staff would provide for manure removal as part of the maintenance tasks associated with this project.

6.3 MHPA BOUNDARY

The City's MSCP Subarea Plan reserved a 30-40 acre for future development of an equestrian center. The location of this "reserved area," shown on Figure 4, actually totals about 31.6 acres (source: SanGIS digital maps).. The project footprint as shown on Figure 5 would use approximately 5.9 acres of the 31.6-acre set-aside area. Moving easterly, the remainder of the development will occur in 2.2 acres designated as MHPA (See strip on Figure 5) and 3.7 acres not designated as MHPA. Based on the existing MHPA mapping, the project would impact 2.2 acres of MHPA-designated land and 9.6 acres of non-MHPA land. The existing MHPA boundary is proposed to be adjusted to account for the shift of the staging area slightly to the east of the existing non-MHPA bubble that was set aside in the MSCP specifically for the staging area. The City's Subarea Plan (1997) states that adjustments to the MHPA may be made without the need to amend the City's Subarea Plan or the MSCP Plan in cases where the new MHPA boundary results in an area of equivalent or higher biological value. The final determination regarding the biological value of a proposed boundary change will be made by the City in accordance with the MSCP Plan, with the concurrence of the wildlife agencies.

The Project proposes to expand the MHPA by 6.5 acres along the western side of the originally planned staging area site. The MHPA would be reduced by 2.2 acres (See Figure 8). The 6.5-acre addition is proposed to offset the impacts to the current MHPA, and to provide for adequate mitigation area for the

project.

In order for a boundary adjustment to be approved, there are six points that must be addressed in terms of the biological value of the areas being evaluated (City of San Diego 1998). Each of the six points is listed below, followed by an analysis of the effects of the proposed boundary adjustment.

1. Effects on significantly and sufficiently conserved habitats (i.e., the exchange maintains or improves the conservation, configuration, or status of significantly or sufficiently conserved habitats, as defined in Section 3.4.2.).

   The 2.2-acre area to be removed from the MHPA consists of non-native grassland, a Tier III habitat. The westerly 6.5-acre area to be added to the MHPA consists primarily of mixture of broom baccharis scrub, Diegan coastal sage scrub and minor amounts of non-native grassland (Table 6; Figure 8). There are also some wetland habitats in the addition area, including patches of juncus meadow, mule fat scrub and a disturbed basin that is now developing into a seasonal, isolated wetland dominated by spikerush. The western portion of the addition area includes a low-lying, flat area that has a drainage that meanders across the flat area. The area likely supports varying degrees of wetland vegetation depending on the season and amount of rainfall. The MHPA boundary adjustment would result in an increase of acreage, and increase in habitat quality.

Table 6
MHPA BOUNDARY ADJUSTMENT ANALYSIS (acre)

Habitat	MSCP Status	Proposed MHPA Removal	Proposed MHPA Addition	Net Difference
Mule Fat Scrub	Sensitive	--	0.04	+0.04
Juncus Meadow	Sensitive	--	0.16	+0.16
Diegan Coastal Sage Scrub	Sensitive	--	0.43	+0.43
Diegan Coastal Sage Scrub – disturbed	Sensitive	--	1.57	+1.57
Broom Baccharis Scrub	Sensitive	--	2.62	+2.62
Non-native Grassland	Sensitive	2.2	1.30	-0.90
Disturbed	Non-sensitive	--	0.30	+0.30
Disturbed Basin	Sensitive	--	0.04	+0.04
	TOTAL	2.2	6.46	+4.26

After the boundary adjustment is implemented, there would be a total of 19.25 acres of land that is still located outside the limits of the project development and the MHPA. Of the 19.25 acres outside the MHPA, 5.5 acres is located within the Caltrans mitigation site and 13.75 acres is west of the proposed equestrian center and north of the Caltrans mitigation site. This 13.75 acres would be available for possible future use for park facilities.

2. Effects to covered species (i.e., the exchange maintains or increases the conservation of covered species).

   No covered species were observed or are expected to occur in the areas to be removed from the MHPA. Covered species observed in the area being added to the MHPA included orange-throated whiptail and black-tailed jack rabbit. The habitat in the area being added to the MHPA is likely to support a higher diversity of sensitive species than the area being deleted, based on the position of

the area being added relative to the rest of the preserve, the habitats in both areas, and the more disturbed nature of the area being deleted from the MHPA.

3. Effects on habitat linkages and function of preserve areas (i.e., the exchange maintains or improves a habitat linkage or wildlife corridor).

   During siting studies for the multi-use staging area, consideration was given to siting the facility further to the west. As shown on Figure 4, which includes biological information for land to the west, moving the project further to the west would encroach further into the park and come closer to the significant north-south wildlife corridor that connects to open space north of SR-52 via a bridge structure. Species observed along this corridor during limited surveys included least Bell's vireo and yellow warbler. The project has been reduced in size from 30-40 potential acres to only 11.8 acres, and has been sited on the edge of the park outside of sensitive wetland habitat areas.

4. Effects on preserve configuration and management (i.e., the exchange results in similar or improved management efficiency and/or protection for biological resources).

   Please see response to Number 3 above. In addition, the proposed boundary adjustment would remove area currently designated MHPA that is sited along the boundary of the park (closer to noise influences of SR-52 and in disturbed habitat) and add to the MHPA land located closer to an established wildlife corridor that is more interior to the preserve. Siting the staging facility along the edge of the preserve (as opposed to a more central location within the preserve) improves management efficiency of the preserve due to the decreased edge effects, increasing habitat contiguity, and providing a greater separation (buffer) from the major wildlife corridor to the east (Spring Canyon).

5. Effects on ecotones or other conditions affecting species diversity (i.e., the exchange maintains topographic and structural diversity and habitat interfaces of the preserve).

   There is not much difference in terms of topography between the areas being added and removed from the preserve. However, the adjustment will site future development along the edge of the park as opposed to more interior to the preserve, which reduces edge effects on the preserve and results in less impacts to habitat interfaces. By siting the project to the eastern edge of the potential development bubble, a better connection between the Caltrans mitigation site, the adjacent scrub habitat, and the large hill to the north is provided.

6. Effects to species of concern not on the covered species list (i.e., the exchange does not significantly increase the likelihood that an uncovered species will meet the criteria for listing under either the federal or state ESAs).

   The proposed boundary adjustment is not expected to increase the likelihood that an uncovered species will be significantly impacted and meet the criteria for listing under federal or state ESAs. There were two species of concern in the boundary adjustment areas observed during the surveys for the project. Black-tailed jackrabbit and orange-throated whiptail were observed within the area being added to the preserve. No species of concern were observed within the area being deleted from the MHPA.

7.0 MITIGATION

7.1 MITIGATION FOR DIRECT IMPACTS

Development impacts for this project are would be mitigated in compliance with the mitigation ratios and preservation requirements of the MSCP. The location of the impact and mitigation, relative to the MHPA, determine mitigation under the MSCP. A summary of mitigation requirements for the sensitive habitats on site is provided in Table 7.

Table 7
MITIGATION REQUIREMENTS

Vegetation/Habitat Communities	Tier	Acres Impacted	Mitigation Ratio*	Total Mitigation	Mitigation Tier
Upland Habitats					
Diegan Coastal Sage Scrub	II	0.37	1:1	0.37	I – III
Diegan Coastal Sage Scrub – Disturbed	II	0.30	1:1	0.30	I – III
Broom Baccharis Scrub – Disturbed	II	0.41	1:1	0.41	I – III
Non-Native Grassland	III B	10.00	0.5-1:1	5.0	I – III
TOTAL		10.68		6.08	

*Ratio varies based on whether impact and subsequent mitigation occurs inside or outside the MHPA. All impacts are assumed to occur outside the MHPA and be mitigated within the MHPA.

Impacts to Diegan coastal sage scrub (including disturbed) and broom baccharis scrub for the project site would require 0.67 and 0.41 acre of Tier I – III habitats, respectively. Non-native grassland impacts would require 5.0 acres of Tier I – III habitats, for a total of 6.08 acres of mitigation. This mitigation requirement will be met by the preservation of 6.08 acres of habitat within the MHPA. The proposed MHPA boundary adjustment will add 6.5 acres of land located within the area originally set aside in the MSCP Subarea Plan for the staging area project that will be used to mitigate for the impact to 6.08 acres. The 6.5-acre mitigation site contains a mixture of broom baccharis scrub, Diegan coastal sage scrub and minor amounts of non-native grassland (Figure 8). This area also includes a dirt road. In order to ensure that enough Tier II and III habitats are preserved to meet the mitigation requirement of 6.08 acres, a larger area (6.5 acres) has been set aside for mitigation to account for the acreage of the road.

The direct impact to the known location of three shoots of San Diego ambrosia requires implementation of a transplantation program. The proposed location for the mitigation area is the existing San Diego ambrosia mitigation site located west of the Caltrans mitigation site (Figure 4). The mitigation program would involve relocation of the San Diego ambrosia population, and transplanting it by digging it up with shovels and moving it to the established mitigation site. After transplantation, it would be monitored for 3 years. A three-year monitoring program (as opposed to five years) is considered adequate given the small size of the population. Attempts to relocate the 3 shoots in April 2001 have not been successful. In the event the 3 shoots cannot be relocated, then mitigation would be accomplished by providing 3 years of monitoring for the existing mitigation site (the current monitoring program will be completed this year: Sweezey, pers. comm.). The final transplantation / monitoring program must be approved by EAS and MSCP staff prior to issuance of building permits.

7.2 MITIGATION FOR INDIRECT IMPACTS

The following mitigation measures would reduce potential indirect impacts to below a level of significance.

- The project site plan includes grading that is located adjacent to mule fat scrub west of the northern extent of the project grading. The final design of the project will include accurate mapping of these habitats (using survey crews or GPS technology) to ensure that the project can be designed to avoid direct impacts. In addition, all construction activities will be carried out under the supervision of a qualified biologist to ensure that adjacent habitat areas are not inadvertently impacted. The permitted limits of construction will be clearly staked and monitored.

- In order to assure that least Bell's vireos in the adjacent Caltrans mitigation site are not indirectly affected by construction activities during the breeding season (March 15 to September 15), no clearing, grubbing, or grading activities would be permitted to occur during the breeding season if construction noise levels exceed 60 dBA or exceed the ambient noise level if the ambient already exceeds 60 dBA within areas of the Caltrans mitigation site occupied by least Bell's vireos, unless adequate noise attenuation measures are implemented. If construction activity is anticipated during the breeding season, protocol surveys of areas within 500 feet of the site by a qualified biologist would be required prior to construction. If nesting vireos are identified, construction would cease for the remainder of the breeding season unless a qualified acoustician can demonstrate that, with our without noise attenuation measures, construction noise levels will not exceed 60 dBA within vireo-occupied portions of the surveyed area.

- In order to assure that coastal California gnatcatchers in the adjacent MHPA are not indirectly affected by construction activities during the breeding season (March 1 to August 15), no clearing, grubbing, or grading activities would be permitted to occur during the breeding season if construction noise levels exceed 60 dBA within areas of the MHPA occupied by gnatcatchers, unless adequate noise attenuation measures are implemented. If construction activity is anticipated during the breeding season, protocol surveys of areas within 500 feet of the site by a qualified biologist would be required prior to construction. If nesting gnatcatchers are identified, construction would cease for the remainder of the breeding season unless a qualified acoustician can demonstrate that, with our without noise attenuation measures, construction noise levels would not exceed 60 dBA within gnatcatcher-occupied portions of the surveyed area.

- In order to avoid indirect impacts to nesting raptors, grading during the raptor breeding season (December 1 to June 30) shall be avoided unless a survey is conducted by a qualified biologist to confirm that no nesting raptors are located within 500 feet of the construction area. If nesting raptors are identified, grading within 500 feet of the nest shall not be allowed until the nesting season is completed, or unless suitable mitigation measures are approved by the Environmental Analysis Section.

- In order to minimize the proliferation of brown-headed cowbirds, the City's Park Rangers will develop and enforce a program to ensure that equestrian users of the staging area clean up manure and dispose of it properly. The manure storage bins will be sealed to prevent cowbird intrusion. Park rangers will be assigned (on a year-round basis) to patrol the campground to make sure the lids are kept closed, and to pick up any manure that is left on the ground outside the containers. In addition, the City will implement an ongoing cowbird trapping program to remove any cowbirds attracted to the site and the adjacent least Bell's vireo mitigation site. The cowbird trapping program will be developed and implemented by the Park and Recreation Department, and must be approved by MSCP and EAS staff prior to issuance of building permits.

- Final design for the project will ensure that low intensity lighting is used and that it is shielded and directed away from sensitive habitat areas.

- The final design of the project should also include use of signage, fencing and landscaping to direct people away from sensitive habitat areas. The final design of the project should also incorporate the site plan's (Figure 3) concept to use native landscaping, and use of dense tree plantings to buffer the parking lot in the western extent of the project from the Caltrans mitigation site and the adjacent drainage to the west.

- The park rangers should monitor the trails to ensure that manure accumulation on the trails is not attracting brown-headed cowbirds, or resulting in water quality impacts to the adjacent creek crossing west of the site. If so, appropriate trail maintenance measures should be implemented.

8.0 CERTIFICATION/QUALIFICATION

The following individuals contributed to the fieldwork and/or preparation of this report.

Amy Bridgeman, B.S., M.S.
Tom Huffman, B.S., M.P.A.
Debbie Pudoff, B.A.
Fred Sproul, B.A.

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Appendix A
SURVEY INFORMATION

DATE	BIOLOGISTS*	PURPOSE	WEATHER
5/21/99	TH, FS	Vegetation mapping; General botanical survey; General zoological survey; Rare plant survey	N/A
6/1/99	TH	Vegetation mapping	N/A
6/25/99	DP	General zoological survey	N/A

*TH = Tom Huffman; DP = Debbie Pudoff; FS = Fred Sproul.

Appendix B
PLANT SPECIES OBSERVED

FAMILY SCIENTIFIC NAME	COMMON NAME	WHERE OBSERVED*
DICOTYLEDONES		
Anacardiaceae		
Malosma laurina	laurel sumac	DCSS
Rhus integrifolia	lemonadeberry	DCSS
Apiaceae		
Foeniculum vulgare	fennel	DH, NNG
Asteraceae		
Ambrosia psilostachya	western ragweed	NNG
Anthemis cotula	dog mayweed	NNG
Artemisia californica	California sagebrush	DCSS
Baccharis salicifolia	mule fat	MFS
Baccharis sarothroides	broom baccharis	DCSS
Carduus pycnocephala	Italian thistle	NNG
Centaurea melitensis	tocalote	NNG
Conyza sp.	horseweed	NNG, DH
Cotula coronopifolia	brassbuttons	JM
Cynara cardunculus	cardoon, artichoke thistle	NNG
Encelia californica	common encelia	DCSS
Eriophyllum confertiflorum	golden yarrow	DCSS
Filago gallica	narrowleaf filago	NG
Gnaphalium canescens	felty everlasting	DCSS
Gnaphalium microcephalum	white everlasting	DCSS
Gnaphalium palustre	lowland cadweed	JM
Gutierrezia sarothrae	San Joaquin matchweed	DCSS
Hedypnois cretica	Crete hedyprois	NNG
Hemizonia fasciculata	fascicled tarplant	DCSS
Hypochaeris glabra	smooth cat's-ear	NNG
Isocoma menziesii	coast goldenbush	DCSS
Lactuca seriola	wild lettuce	NNG
Lessingia filaginifolia	sand-aster	DCSS
Matricaria matricarioides	pineapple-weed	NNG
Picris echioides	bristly ox-tongue	NNG
Silybum marianum	milk thistle	NNG
Sonchus asper	prickly sow-thistle	NNG
Xanthium strumarium	cocklebur	JM
Boraginaceae		
Heliotropum curvassavicum	salt heliotrope	JM
Brassicaceae		
Brassica nigra	black mustard	NNG
Hirschfeldia incana	hirschfeldia	NNG
Raphanus sativus	radish	NNG

Appendix B (cont.)

FAMILY SCIENTIFIC NAME	COMMON NAME	WHERE OBSERVED*
Caprifoliaceae		
Sambucus mexicana	Mexican elderberry	DCSS
Caryophyllaceae		
Spergularia villosa	sand-spurrey	NNG
Chenopodiaceae		
Atriplex semibaccata	Australian saltbush	DCSS
Salsola tragus	Russian thistle	NNG
Cistaceae		
Helianthemum scoparium	peak rush rose	DCSS
Convolvulaceae		
Calystegia macrostegia	morning glory	DCSS
Euphorbiaceae		
Eremocarpus setigerus	dove weed	NG
Fabaceae		
Lotus scoparius	deerweed	DCSS
Lotus purshianus	Spanish clover	JM
Medicago polymorpha	bur-clover	NNG
Melilotus indicus	Indian sweet clover	JM
Trifolium sp.	clover	NNG, NG
Geraniaceae		
Erodium botrys	pin clover	NNG, NG
Erodium cicutarium	red-stem filaree	NNG, NG
Geranium carolinianum	Carolina geranium	JM
Lamiaceae		
Salvia apiana	white sage	DCSS
Salvia mellifera	black sage	DCSS
Stachys adjugoides	hedge nettle	JM
Lythraceae		
Lythrum hyssopifolium	grass poly	RW
Myrtaceae		
Eucalyptus sp.	eucalyptus	NNG
Platanaceae		
Platanus racemosa	Western sycamore	S
Polygonaceae		
Eriogonum fasciculatum	California buckwheat	DCSS
Rumex crispus	curly dock	JM, MFS
Primulaceae		
Anagallis arvensis	scarlet pimpernel	NNG, NG
Rosaceae		
Heteromeles arbutifolia	toyon	S
Salicaceae		
Populus fremontii	western cottonwood	RW
Salix gooddingii	black willow	SWS, RW
Scrophulariaceae		
Mimulus aurantiacus	yellow monkey-flower	DCSS
Viscaceae		
Phoradendron sp.	mistletoe	S

Appendix B (cont.)

FAMILY SCIENTIFIC NAME	COMMON NAME	WHERE OBSERVED*
MONOCOTYLEDONES		
Cyperaceae		
Carex praegraellis	clusterfield sedge	JM
Eleocharis macrostachya	spikerush	JM
Scirpus robustus	nut sedge	JM
Juncaceae		
Juncus dubius	mariposa rush	JM
Juncus xiphioides	iris-leaved rush	JM
Poaceae		
Avena barbata	slender wild oat	NNG, NG
Avena fatua	wild oat	NNG, NG
Bromus diandrus	ripgut grass	NNG
Bromus hordeaceus	soft chess	NNG, NG
Distichlis spicata	saltgrass	NNG, NG
Hordeum marinum	barley grass	NNG
Lolium multiflorum	Italian ryegrass	JM
Muhlenbergia rigens	deergrass	JM
Nassella pulchra	purple needlegrass	NG, DCSS
Paspalum sp.	Dallas grass	JM
Polypogon monspeliensis	rabbitfoot grass	JM
Vulpia myuros	foxtail fescue	NNG, NG
Typhaceae		
Typha sp.	cattail	JM

*BS = broom baccharis scrub; DB = disturbed basin; DCSS = Diegan coastal sage scrub; DH = disturbed habitat; JM = Juncus Meadow; MFS = mule fat scrub; NG = native grassland; NNG = non-native grassland; RW = riparian woodland; S = sycamore trees; SWS = southern willow scrub.

Appendix C
ANIMAL SPECIES OBSERVED/DETECTED*

COMMON NAME	SCIENTIFIC NAME	WHERE OBSERVED**
INVERTEBRATES		
Diptera		
Flies		Throughout
Homoptera		
Cicadas		NNG
Hymenoptera		
Ants, bees		DH, DCSS
Lepidoptera		
Acmon blue	*Icaricia acmon*	NNG
Western tiger swallowtail	*Papilio rutulus*	BS, NNG
Behr's metalmark	*Apodemia mormo virgulti*	DH, DCSS
California ringlet	*Coenonympha californica*	NNG
Cabbage white	*Artogeia rapae*	DH
Odonata		
Dragonflies		DH
Orthoptera		
Grasshoppers		NNG
AMPHIBIANS		
None observed/detected		
REPTILES		
Lacertilia		
Common kingsnake	*Lampropeltis getulus*	DH
Orange-throated whiptail	*Cnemidophorus hyperythrus beldingi**	BS
Western fence lizard	*Sceloporus occidentalis*	DH
BIRDS		
Accipitridae		
White-tailed kite	*Elanus leucurus**	RW, NNG, DCSS
Red-shouldered hawk	*Buteo lineatus**	SWS
Red-tailed hawk	*Buteo jamaicensis*	CSS, NNG
Aegithalidae		
Bushtit	*Psaltriparus minimus*	SWS, S

Appendix C (cont.)

COMMON NAME	SCIENTIFIC NAME	WHERE OBSERVED**
BIRDS, cont.		
Apodidae		
White-throated swift	*Aeronautes saxatalis*	RW
Cathartidae		
Turkey vulture	*Cathartes aura**	NG
Columbidae		
Mourning dove	*Zenaida macroura*	SWS
Corvidae		
Common raven	*Corvus corax*	NNG, DCSS
Emberizidae		
Yellow warbler	*Dendroica petechia**	SWS
Common yellowthroat	*Geothlypis trichas*	SWS
Yellow-breasted chat	*Icteria virens**	RW
Blue grosbeak	*Guiraca caerulea*	BS, SWS
Spotted towhee	*Pipilo maculatus*	SWS
California towhee	*Pipilo crissalis*	SWS
So. Cal. rufous-crowned sp.	*Aimophila ruficeps canescens**	NNG
Grasshopper sparrow	*Ammodramus savannarum**	Throughout
Song sparrow	*Melospiza melodia*	SWS
Western meadowlark	*Sturnella neglecta*	NNG
Oriole species	*Icterus sp.*	S
Fringillidae		
House finch	*Carpodacus mexicanus*	S
Lesser goldfinch	*Carduelis psaltria*	Throughout
Hirundinidae		
Northern rough-winged swallow	*Stelgidopteryx serripennis*	NNG
Cliff swallow	*Hirundo pyrrhonota*	Throughout
Muscicapidae		
Wrentit	*Chamaea fasciata*	BS
Picidae		
Nuttall's woodpecker	*Picoides nuttallii*	S
Ptilogonatidae		
Phainopepla	*Phainopepla nitens*	S
Trochilidae		
Anna's hummingbird	*Calypte anna*	SWS
Costa's hummingbird	*Calypte costae*	BS
Troglodytidae		
House wren	*Troglodytes aedon*	SWS, S
Bewick's wren	*Thryomanes bewickii*	BS
Tyrannidae		
Black phoebe	*Sayornis nigricans*	S
Ash-throated flycatcher	*Myiarchus cinerascens*	S
Cassin's kingbird	*Tyrannus vociferans*	SWS

COMMON NAME	SCIENTIFIC NAME	WHERE OBSERVED**
BIRDS, cont.		
Tytonidae		
Barn owl	*Tyto alba*	S
Vireonidae		
Least Bell's vireo	*Vireo bellii pusillus**	SWS
MAMMALS		
Canidae		
Domestic dog	*Canis familiaris*	DH
Coyote	*Canis latrans*	DH
Cervidae		
Mule deer	*Odocoileus hemionus*	DB
Cricetinae		
Woodrat	*Neotoma* sp.	DCSS
Geomyidae		
Botta's pocket gopher	*Thomomys bottae*	NNG
Leporidae		
Desert cottontail Throughout	*Sylvilagus audubonii*	
San Diego black-tailed jackrabbit	*Lepus californicus bennettii**	NNG, DB
Sciuridae		
California ground squirrel	*Spermophilus beecheyi*	NNG

*Sensitive species
**BS = broom baccharis scrub; DB = disturbed basin; DCSS = Diegan coastal sage scrub; DH = disturbed habitat; NG = native grassland; NNG = non-native grassland; RW = riparian woodland; S = sycamore trees; SWS = southern willow scrub.

Appendix D
EXPLANATION OF SENSITIVITY CODES FOR PLANTS AND ANIMALS

U.S. FISH AND WILDLIFE SERVICE (USFWS)

FE =	Federally listed endangered
FT =	Federally listed threatened
PE =	Federally proposed endangered
PT =	Federally proposed threatened
FC* =	Federal candidate species
FSC† =	Federal species of special concern

CALIFORNIA DEPARTMENT OF FISH AND GAME (CDFG)

CE =	State listed endangered
CR =	State listed rare
CT =	State listed threatened
CSC =	State species of special concern
Special Animal	Refers to all vertebrate and invertebrate taxa of concern to the Natural Diversity Data Base regardless of legal or protection status.

BLUE LIST

Species undergoing population or range reductions

CALIFORNIA ENVIRONMENTAL QUALITY ACT

For plants with no current state or federal legal standing, "CEQA" refers to the fact that under the Act, impacts to species may be found significant under certain circumstances (e.g., uniqueness due to size, age, or regional sensitivity).

CALIFORNIA NATIVE PLANT SOCIETY (CNPS)

LISTS

1A = Presumed extinct.

1B = Rare, threatened, or endangered in California and elsewhere. Eligible for state listing.

2 = Rare, threatened, or endangered in California but more common elsewhere. Eligible for state listing.

3 = Distribution, endangerment, and/or taxonomic information needed.

4 = A watch list for species of limited distribution. Needs monitoring for changes in population status.

R-E-D CODE

R (Rarity)

1 = Rare but found in sufficient numbers and distributed widely enough that potential for extinction is low at this time.

2 = Occurrence confined to several populations or to one extended population.

3 = Occurrence limited to one or a few highly restricted populations, or present in such small numbers that it is seldom reported.

E (Endangerment)

1 = Not endangered
2 = Endangered in a portion of its range
3 = Endangered throughout its range

D (Distribution)

1 = More or less widespread outside California
2 = Rare outside California
3 = Endemic to California

*U.S. Fish and Wildlife Service Category 1 has been recently been eliminated – considered "Federal Species of Special Concern" (FSC).
†U.S. Fish and Wildlife Service Category 2 and lesser sensitive candidate species' classifications were renamed as "Regionally Sensitive" (RS), and then renamed "Federal Species of Special Concern" (FSC).

2002-0164934

DOC # 2002-0164934

FEB 27, 2002 1:31 PM

RECORDING REQUESTED BY
CITY OF SAN DIEGO
DEVELOPMENT SERVICES
DEPARTMENT

011650

OFFICIAL RECORDS
SAN DIEGO COUNTY RECORDER'S OFFICE
GREGORY J. SMITH, COUNTY RECORDER
FEES: 0.00

WHEN RECORDED MAIL TO
PERMIT INTAKE
MAIL STATION 501

SPACE ABOVE THIS LINE FOR RECORDER'S USE

[redacted]

East Fortuna Equestrian Staging Area
Hearing Officer

This Permit, Site Development Permit No. 40-0524, is granted by the Hearing Officer of the City of San Diego, to the CITY OF SAN DIEGO, PARK & RECREATION DEPARTMENT, Owner and Permittee, pursuant to the Land Development Code of the City of San Diego. The approximately twelve acre site is located in Mission Trails Regional Park, about 300 yards east of the near the Mast Blvd. underpass at State Route 52. The project site is legally described as Rancho Mission Fanita Rho. Resub. CC348 Map (1703).

Subject to the terms and conditions set forth in this permit, permission is granted to Owner and Permittee to construct an equestrian staging area on approximately 12 acres of northeast Mission Trails Regional Park near Mast Boulevard and State Route 52 entrance, described as, and identified by size, dimension, quantity, type and location on the approved Exhibits "A", dated November 7, 2001, on file in the office of the Development Services Department. The facility shall include:

a. A 5,000 square-foot main structure; a 2,300 square-foot covered group picnic shelter attached to the west side; a screened storage yard attached to the east side; a 425 square-foot service building containing public restrooms; a 15-space parking lot for horse trailers; a 49-space parking lot for other vehicles; horse corrals; picnic areas; multipurpose rings; an open BBQ area; and horse manure storage bins.

b. Landscaping (planting, irrigation and landscape related improvements); and

c. Accessory improvements determined by the City Manager to be consistent with the land use and development standards in effect for this site per the adopted Community Plan, California Environmental Quality Act guidelines, public and private improvement requirements of the City Engineer, the underlying zone(s), conditions of this permit, and any other applicable regulations of the Land Development Code in effect for this site.

1. Construction, grading or demolition must commence and be pursued in a diligent manner within 36 months after the effective date of final approval by the City, following all appeals. Failure to utilize the permit within 36 months will automatically void the permit unless an Extension of Time has been granted. Any such Extension of Time must meet all the Land Development Code requirements and applicable guidelines in effect at the time the extension is considered by the appropriate decision maker.

ORIGINAL

2. No permit for the construction or operation of any facility or improvement described herein shall be granted, nor shall any activity authorized by this permit be conducted on the premises until the Permittee signs and returns the Permit to the Development Services Department.

3. Unless this permit has been revoked by the City of San Diego the property included by reference within this permit shall be used only for the purposes and under the terms and conditions set forth in this permit unless otherwise authorized by the City Manager.

4. This permit is a covenant running with the subject property and shall be binding upon the Permittee and any successor or successors, and the interests of any successor shall be subject to each and every condition set out in this permit and all referenced documents.

5. The utilization and continued use of this permit shall be subject to the regulations of this and any other applicable governmental agencies.

6. Issuance of this permit by the City of San Diego does not authorize the applicant for said permit to violate any Federal, State or City laws, ordinances, regulations or policies including, but not limited to, the Federal Endangered Species Act of 1973 and any amendments thereto (16 U.S.C. Section 1531 et seq.)

FIRE DEPARTMENT REQUIREMENTS:

7. In lieu of providing Fire Department access, the maintenance facility (Structure No. 1) shall be equipped with a fire sprinkler system, satisfactory to the Fire Marshal.

ENVIRONMENTAL/MITIGATION REQUIREMENTS:

8. The applicant shall comply with the Mitigation, Monitoring and Reporting Program (MMRP) as specified in Environmental Impact Report or Mitigated Negative Declaration, LDR No. 40-0524, satisfactory to the City Manager and the City Engineer. Prior to issuance of any grading permits and/or building permits, mitigation measures as specifically outlined in the MMRP shall be implemented for the following issue areas:

a. Biological Resources
b. Archaeological Resources
c. Water Quality/Runoff Control

PLANNING/DESIGN REQUIREMENTS:

9. No fewer than 14 parking spaces for horse trailers, 47 standard parking spaces, and two disabled parking spaces shall be maintained on the property at all times in the approximate locations shown on the approved Exhibits "A," dated November 7, 2001, on file in the office of Development Services Department. Parking spaces shall comply at all times with requirements of the Land Development Code and shall not be converted for any other use unless otherwise authorized by the City Manager.

10. There shall be compliance with the regulations of the underlying zone unless a deviation or variance to a specific regulation(s) is approved or granted as condition of approval of this permit. Where there is a conflict between a condition (including exhibits) of this permit and a regulation of the underlying zone, the regulation shall prevail unless the condition provides for a deviation or variance from the regulations. Where a condition (including exhibits) of this permit

establishes a provision which is more restrictive than the corresponding regulation of the underlying zone, then the condition shall prevail.

11. The height(s) of the building(s) or structure(s) shall not exceed those heights set forth in the conditions and the exhibits or the maximum permitted building height of the underlying zone, whichever is lower, unless a deviation or variance to the height limit has been granted as a specific condition of this permit.

12. A topographical survey conforming to the provisions of the Land Development Code may be required if it is determined, during construction, that there may be a conflict between the building(s) under construction and a condition of this permit or a regulations of the underlying zone. The cost of any such survey shall be borne by the permittee.

13. Any future requested amendment to this permit shall be reviewed for compliance with the regulations of the underlying zone which are in effect on the date of the submittal of the requested amendment.

14. The subject property and associated common areas on site shall be maintained in a neat and orderly fashion at all times.

ENGINEERING REQUIREMENTS:

15. Any party on whom fees, dedications, reservations, or other exactions have been imposed as conditions of approval of this development permit, may protest the imposition within 90 days of the approval of this development permit by filing a written protest with the City Clerk pursuant to California Government Code 66020.

16. Prior to building occupancy, the applicant shall conform to Section 62.0203 of the Municipal Code, "Public Improvement Subject to Desuetude or Damage." If repair or replacement of such public improvements is required, the owner shall obtain the required permits for work in the public right-of-way, satisfactory to the permit-issuing authority.

TRANSPORTATION REQUIREMENTS:

17. The existing gate located on the west end of Mast Boulevard (approximately 100 feet west of Highway 52 southbound off-ramp), shall be temporarily relocated to the City right-of-way line (approximately 60 feet west of the off-ramp). Further, the applicant shall request from Caltrans the right to permanently relocate this gate to approximately ten feet west of the off-ramp, by either property acquisition or an encroachment removal agreement. Either gate installation shall provide access to the existing driveway on the south side of Mast Boulevard, west of the Highway 52 south bound off-ramp. Warning sign(s) shall be installed informing motorists on west bound Mast boulevard motorists and on Highway 52 south bound off-ramp of the park's hours of operation and the gate(s) accessibility to the satisfaction of the City Engineer.

18. The gate nearest to Mast Blvd. shall be closed at anytime that the secondary gate nearest the equestrian staging area is closed to prevent vehicles from entering the access road.

SEWER REQUIREMENTS:

19. If sewer is proposed, the developer shall submit a sewer study satisfactory to the Metropolitan Wastewater Department Director, for the sizing, grade and alignment of the private

ORIGINAL

gravity sewer lateral and to show that the existing and proposed sewer facilities (both public and private) will provide adequate capacity and cleansing velocities necessary to serve this development.

20. If sewer is proposed, the applicant shall provide a letter from the City of Santee indicating that they will accept sewer flows from the proposed development.

LANDSCAPING REQUIREMENTS:

21. In the event that a foundation only permit is requested by the Permittee or subsequent Owner, a site plan or staking layout plan shall be submitted identifying all landscape areas consistent with Exhibit "A," Landscape Concept Plan, dated November 7, 2001, on file in the Office of the Development Services Department. These landscape areas shall be clearly identified with a distinct symbol, noted with dimensions and labeled as "landscaping area."

22. Prior to issuance of any construction permits for structures (including shell), complete landscape and irrigation construction documents consistent with the Landscape Standards (including planting and irrigation plans, details and specifications) shall be submitted to the City Manager for approval. The construction documents shall be in substantial conformance with Exhibit "A," Landscape Concept Plan, dated November 7, 2001, on file in the Office of the Development Services Department.

23. Prior to issuance of any engineering permits for grading, construction documents for slope planting or revegetation and hydroseeding of all disturbed land including irrigation shall be submitted in accordance with the Landscape Standards and to the satisfaction of the City Manager. All plans shall be in substantial conformance to Permit 40-0524 (including Environmental conditions) and Exhibit "A," dated November 7, 2001, on file in the Office of the Development Services Department.

24. Installation of slope planting and erosion control including seeding of all disturbed land (slopes and pads) consistent with the approved landscape and grading plans is considered to be in the public interest. The Permittee shall initiate such measures as soon as the grading has been accomplished. Such erosion control/slope planting and the associated irrigation systems (temporary and/or permanent) and appurtenances shall be installed in accordance with the approved plans and the Landscape Standards.

25. Prior to issuance of any Certificate of Occupancy, it shall be the responsibility of the Permittee or subsequent Owner to install all required landscape and obtain all required landscape inspections.

26. All required landscape shall be maintained in a disease, weed and litter free condition at all times. Severe pruning or "topping" of trees is not permitted unless specifically noted in this Permit.

27. The Permittee or subsequent responsible party shall be responsible for the maintenance of all landscape improvements (right-of-way and median landscaping) consistent with the Landscape Standards unless long-term maintenance of street trees, right-of-way and median landscaping will be the responsibility of a Landscape Maintenance District or other approved entity. In this case, a Landscape Maintenance Agreement shall be submitted for review by a Landscape Planner.

28. If any required landscape (including existing or new planting, hardscape, landscape features, etc.) indicated on the approved construction document plans is damaged or removed during demolition or construction, it shall be repaired and/or replaced in kind and equivalent size per the approved documents to the satisfaction of the City Manager within 30 days of damage or Certificate of Occupancy.

BRUSH MANAGEMENT PROGRAM:

30. The Permittee shall implement the following requirements in accordance with the Brush Management Program shown on Exhibit "A" Brush Management Program/Landscape Concept Plan, dated November 7, 2001, on file in the Office of the Development Services Department.

a. Prior to issuance of any engineering permits for grading, landscape construction documents required for the engineering permit shall be submitted showing the brush management zones on the property in substantial conformance with Exhibit "A."

b. Prior to issuance of any building permits, a complete set of brush management construction documents shall be submitted for approval to the City Manager and the Fire Marshall. The construction documents shall be in substantial conformance with Exhibit "A" and shall comply with the Uniform Fire Code, M.C. 55.0889.0201, the Landscape Standards and the Land Development Code Section 142.0412 (Ordinance -18451).

c. The Brush Management Program shall consist of two zones consistent with the Brush Management regulations of the Land Development Code section 142.0412 as follows:

Zone One	Zone Two
30'	40'

d. The construction documents shall conform to the Architectural features as described in Section 142.0412(d).

e. Within Zone One combustible accessory structures (including, but not limited to decks, trellises, gazebos, etc) are not permitted while non-combustible accessory structures may be approved within the designated Zone One area subject to Fire Marshall and the City Manager's approval.

f. Provide the following note on the Brush Management Construction Documents: "It shall be the responsibility of the Permittee to schedule a pre-construction meeting on site with the contractor and the Development Services Department to discuss and outline the implementation of the Brush Management Program."

g. In zones One & Two, no invasive plant material shall be permitted as jointly determined by the Landscape Section and the Environmental Analysis Section.

31. Prior to final inspection for any building, the approved Brush Management Program shall be implemented.

ORIGINAL

32. The Brush Management Program shall be maintained at all times in accordance with the City of San Diego's Landscape Standards.

INFORMATION ONLY

Any party on whom fees, dedications, reservations, or other exactions have been imposed as conditions of approval of this development permit/tentative map, may protest the imposition within 90 days of the approval of this development permit/tentative map by filing a written protest with the City Clerk pursuant to California Government Code 66020.

APPROVED by the Hearing Officer of the City of San Diego on November 7, 2001.

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ALL-PURPOSE CERTIFICATE

Type/Number of Document SDP No. 40-0524
Date of Approval November 7, 2001

STATE OF CALIFORNIA
COUNTY OF SAN DIEGO

Juan Baligad
Juan Baligad, Development Project Manager

On Nov. 7, 2001, 2001, before me, Stacie L. Maxwell, (Notary Public), personally appeared **Juan Baligad**, Development Project Manager of the Development Services Department of the City of San Diego, personally known to me 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~~ 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.

STACIE L. MAXWELL
Commission # 1268390
Notary Public - California
San Diego County
My Comm. Expires Jun 24, 2004

WITNESS my hand and official seal

Signature Stacie L. Maxwell
Name of Notary

ALL-PURPOSE CERTIFICATE

OWNER(S)/PERMITTEE(S) SIGNATURE/NOTARIZATION:

THE UNDERSIGNED OWNER(S)/PERMITTEE(S), BY EXECUTION THEREOF, AGREES TO EACH AND EVERY CONDITION OF THIS PERMIT AND PROMISES TO PERFORM EACH AND EVERY OBLIGATION OF OWNER(S)/PERMITTEE(S) THEREUNDER.

Signed Robin Shifflet
Typed Name

Signed _____
Typed Name

Robin Shifflet
City of San Diego Park & Recreation Department

STATE OF California
COUNTY OF San Diego

On Nov. 7, 2001 before me, Stacie L. Maxwell (Name of Notary Public)
personally appeared Robin Shifflet, personally known to me (~~or 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.

WITNESS my hand and official seal.

Signature Stacie L. Maxwell

STACIE L. MAXWELL
Commission # 1268390
Notary Public - California
San Diego County
My Comm. Expires Jun 24, 2004

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HEARING OFFICER
RESOLUTION NO.
Site Development Permit No. 40-0524
East Fortuna Equestrian Staging Area

WHEREAS, CITY OF SAN DIEGO, PARK & RECREATION DEPARTMENT, Owner/ Permittee, filed an application with the City of San Diego for a permit to construct an equestrian staging area (as described in and by reference to the approved Exhibits "A" and corresponding conditions of approval for the associated Permit No. 40-0524), on a 12-acre portion of Mission Trails Regional Park, and;

WHEREAS, the project site is located in Mission Trails Regional Park, about 300 yards east of the near the Mast Blvd. underpass at State Route 52 in the Mission Trails Regional Park and;

WHEREAS, the project site is legally described as Rancho Mission Fanita Rho. Resub. CC348 Map (1703), and;

WHEREAS, on November 7, 2001, the Hearing Officer of the City of San Diego considered Site Development Permit No. 40-0524, pursuant to the Land Development Code of the City of San Diego; NOW, THEREFORE,

BE IT RESOLVED by the Hearing Officer of the City of San Diego as follows:

That the Hearing Officer adopts the following written Findings, dated November 7, 2001.

FINDINGS:

Findings for all Site Development Permits

1. **The proposed development will not adversely affect the applicable land use plan;**

   The Park & Recreation Department has designed the project to be consistent with the Mission Trails Regional Park Master Development Plan, and with close input from the Mission Trails Regional Park Community Action Committee and Task Force. The project implements the Mission Trails Regional Park Master Development Plan which calls for a recreational staging area near the northeastern Park entrance.

2. **The proposed development will not be detrimental to the public health, safety, and welfare; and**

   The project would benefit the public health, safety, and welfare with the provision of improved access for horse riders, hikers, and bicyclists to the existing trail system of Mission Trails Regional Park. Among the amenities to be provided by the project are restrooms and a parking area that would accommodate standard motor vehicles and horse trailers.

ORIGINAL

3. **The proposed development will comply with the applicable regulations of the Land Development Code.**

The Land Development Code considers the project site as "environmentally sensitive lands" because it contains "sensitive biological resources." A Site Development Permit is required by the Environmentally Sensitive Lands (ESL) regulations for projects located within environmentally sensitive lands. The purpose of this Site Development Permit is to implement the ESL regulations "to protect, preserve, and, where damaged restore, the environmentally sensitive lands of San Diego, and the viability of species supported by those lands." The project includes as project condition, a Mitigation, Monitoring, and Reporting Program (MMRP) that ensures the protection and preservation of environmentally sensitive lands within the project site.

Project impacts to coastal sage scrub, broom baccharis scrub, and nonnative grasslands would be mitigated by the addition of 6.46 acres of an adjacent development area to the (Multi-habitat Preservation Area) MHPA preserve. The adjacent 6.46 acres contains 2.62 acres of broom baccharis scrub, 1.9 acres of coastal sage scrub, 1.3 acres of nonnative grasslands, and 0.30 acre of nonnative grassland. Required transplantation and five-year monitoring of the San Diego Ambrosia (if found) would assure its long-term success. In addition, all construction/grading activities are required to be monitored by a qualified biologist to ensure that adjacent habitat areas are not inadvertently impacted. The permitted limits of construction/grading are to be clearly staked and monitored.

All runoff from parking areas as well as the horse corral and wash down areas, is required to be initially directed to grassy swale detention basins and made to terminate at rip-rapped deceleration structures prior to flowing into the Caltrans mitigation site and/or the San Diego River. The required grassy swale is to be sufficiently sized to adequately treat all runoff from the developed site, and consistent with forthcoming City guidelines for Stormwater Best Management Practices (BMP's) as required by the City's Urban Runoff Management Program.

A required removal program of horse manure would discourage the proliferation of the brown-headed cowbird, which is a predator to least Bell's vireo nests, and would reduce the potential fouling of the river waters. To protect the threatened least Bell's vireo and California gnatcatcher, construction and grading activity are prohibited during the breeding season of either bird, if noises from these activities exceed 60 decibels. In addition, the final improvement plans are required to show that low intensity lighting is used and that it is shielded and directed away from adjacent MHPA areas, and include the use of signage, fencing, and landscaping to direct park users away from sensitive areas including the adjacent Caltrans mitigation site. Specifically, the use of native vegetation and use of dense tree plantings to buffer the parking lot in the western extent of the project from the Caltrans wetland mitigation site and the adjacent drainage to the west would be required.

Lastly, the installation of a septic system is required to be located such that there would be no direct influent flows into the 100-year floodplain of westerly drainage, the detention basins on site, the Caltrans mitigation site, and/or the San Diego River. Measures are required to be in place to prevent mixture of flows from the leach fields into the runoff detention basins. The design/placement of leach fields is to be approved by the Environmental Analysis Section (EAS) and the Multiple Species Conservation Program (MSCP) prior to its submission to the County Health Department for approval.

Supplemental Findings--Environmentally Sensitive Lands

1. **The site is physically suitable for the design and siting of the proposed development and the development will result in minimum disturbance to environmentally sensitive lands;**

The project site is a portion of a 30-acre site designated by the Mission Trails Regional Park Master Development Plan for this project. This site was not placed within the Multi-Habitat Planning Area (MHPA), in anticipation of the development. The project is located within that 30-acre site, and would provide staging facilities in the northeastern area of Mission Trails Regional Park.

A Mitigation, Monitoring, and Reporting Program (MMRP) has been developed so that the development would result in minimum disturbance to environmentally sensitive lands. All construction and grading activities are required to be monitored by a qualified biologist to ensure that adjacent habitat areas are not inadvertently impacted. The permitted limits of construction and grading are to be clearly staked and monitored.

All runoff from parking areas as well as the horse corral and wash down areas, is required to be initially directed to grassy swale detention basins and made to terminate at rip-rapped deceleration structures prior to flowing into the Caltrans mitigation site and/or the San Diego River. The required grassy swale is to be sufficiently sized to adequately treat all runoff from the developed site, and consistent with forthcoming City guidelines for Stormwater Best Management Practices (BMP's) as required by the City's Urban Runoff Management Program.

A required removal program of horse manure would discourage the proliferation of the brown-headed cowbird, which is a predator to least Bell's vireo nests, and would reduce the potential fouling of the river waters. To protect the threatened least Bell's vireo and California gnatcatcher, construction and grading activity are prohibited during the breeding season of either bird, if noises from these activities exceed 60 decibels. If nesting raptors are identified, construction/grading activity would be prohibited until the nesting season is completed, or unless suitable mitigation measures are approved by the program manager of MSCP and the Assistant Deputy Director of the Land Development Review (LDR) Division of the Environmental Analysis Section (EAS).

ORIGINAL

In addition, the final improvement plans are required to show that low intensity lighting is used and that it is shielded and directed away from adjacent MHPA areas, and include the use of signage, fencing, and landscaping to direct park users away from sensitive areas including the adjacent Caltrans mitigation site. Specifically, the use of native vegetation and use of dense tree plantings to buffer the parking lot in the western extent of the project from the Caltrans wetland mitigation site and the adjacent drainage to the west would be required.

Lastly, the installation of a septic system is required to be located such that there would be no direct influent flows into the 100-year floodplain of westerly drainage, the detention basins on site, the Caltrans mitigation site, and/or the San Diego River. Measures are required to be in place to prevent mixture of flows from the leach fields into the runoff detention basins. The design/placement of leach fields si to be approved by EAS/MSCP prior to its submission to the County Health Department for approval.

2. **The proposed development will minimize the alteration of natural land forms and will not result in undue risk from geologic and erosional forces, flood hazards, or fire hazards;**

Construction grading is minimal and would maintain existing drainage flow, and to create silt detention basins. In addition, site grading would also stabilize fill soils on the project site. A sprinkler system is required in the main building by project condition. As such, the proposed development will minimize the alteration of natural land forms and will not result in undue risk from geologic and erosional forces, flood hazards, or fire hazards.

3. **The proposed development will be sited and designed to prevent adverse impacts on any adjacent environmentally sensitive lands;**

The project site is a portion of a 30-acre site designated by the Mission Trails Regional Park Master Development Plan for this project. This site was not placed within the Multi-Habitat Planning Area (MHPA) in anticipation of the development. The project is located within that 30-acre site, and would provide staging facilities in the northeastern area of Mission Trails Regional Park.

A Mitigation, Monitoring, and Reporting Program (MMRP) has been developed so that the development would result in minimum disturbance to adjacent environmentally sensitive lands. The project impacts to coastal sage scrub, broom baccharis scrub, and nonnative grasslands would be mitigated by the addition of 6.46 acres of an adjacent development area to the MHPA preserve. The adjacent 6.46 acres contains 2.62 acres of broom baccharis scrub, 1.9 acres of coastal sage scrub, 1.3 acres of nonnative grasslands, and 0.30 acre of nonnative grassland. All construction/grading activities are required to be monitored by a qualified biologist to ensure that adjacent habitat areas are not

inadvertently impacted. The permitted limits of construction/grading are to be clearly staked and monitored.

All runoff from parking areas as well as the horse corral and wash down areas, is required to be initially directed to grassy swale detention basins and made to terminate at rip-rapped deceleration structures prior to flowing into the Caltrans mitigation site and/or the San Diego River. The required grassy swale is to be sufficiently sized to adequately treat all runoff from the developed site, and consistent with forthcoming City guidelines for Stormwater Best Management Practices (BMP's) as required by the City's Urban Runoff Management Program.

A required removal program of horse manure would discourage the proliferation of the brown-headed cowbird, which is a predator to least Bell's vireo nests, and would reduce the potential fouling of the river waters. To protect the threatened least Bell's vireo and California gnatcatcher, construction and grading activity are prohibited during the breeding season of either bird, if noises from these activities exceed 60 decibels. If nesting raptors are identified, construction/grading activity would be prohibited until the nesting season is completed, or unless suitable mitigation measures are approved by the program manager of MSCP and the Assistant Deputy Director of LDR/EAS.

In addition, the final improvement plans are required to show that low intensity lighting is used and that it is shielded and directed away from adjacent MHPA areas, and include the use of signage, fencing, and landscaping to direct park users away from sensitive areas including the adjacent Caltrans mitigation site. Specifically, the use of native vegetation and use of dense tree plantings to buffer the parking lot in the western extent of the project from the Caltrans wetland mitigation site and the adjacent drainage to the west would be required.

Lastly, the installation of a septic system is required to be located such that there would be no direct effluents into the 100-year floodplain of westerly drainage, the detention basins on site, the Caltrans mitigation site, and/or the San Diego River. Measure is required to be in place to prevent mixture of flows from the leach fields into the runoff detention basins. The design/placement of leach fields is to be approved by EAS/MSCP prior to its submission to the County Health Department for approval.

4. **The proposed development will be consistent with the City of San Diego's Multiple Species Conservation Program (MSCP) Subarea Plan;**

The project site is a portion of a 30-acre site designated by the Mission Trails Regional Park Master Development Plan for this project. This site was not placed within the Multi-Habitat Planning Area (MHPA), in anticipation of the development. The MHPA is the City's planned wildlife preserve which would implements the MSCP Subarea Plan. The project is located within that 30-acre site, and would provide recreational staging

facilities in this area of Mission Trails Regional Park. Passive recreational uses such as trails within the MHPA are consistent with the MSCP Subarea Plan.

Project impacts to coastal sage scrub, broom baccharis scrub, and nonnative grasslands would be mitigated by the addition of 6.46 acres of an adjacent development area to the MHPA preserve. The adjacent 6.46 acres contains 2.62 acres of broom baccharis scrub, 1.9 acres of coastal sage scrub, 1.3 acres of nonnative grasslands, and 0.30 acre of nonnative grassland.

As discussed above, this northern staging area for trail system within Mission Trails Regional Park was accommodated and anticipated by the MSCP Subarea Plan. The Park & Recreation Department has designed the project to be consistent with the Mission Trails Regional Park Master Development Plan, and with close input from the Mission Trails Regional Park CAC and Task Force. In addition, mitigation measures would add almost 6.5 acres to the MHPA preserve.

5. **The proposed development will not contribute to the erosion of public beaches or adversely impact local shoreline sand supply; and**

The project is not located near any public beaches or shorelines, and therefore, would not adversely impact local shoreline sand supply.

6. **The nature and extent of mitigation required as a condition of the permit is reasonably related to, and calculated to alleviate, negative impacts created by the proposed development.**

A Mitigation, Monitoring, and Reporting Program (MMRP) has been developed to alleviate the negative impacts created by the project. All construction/grading activities are required to be monitored by a qualified biologist to ensure that adjacent habitat areas are not inadvertently impacted. The permitted limits of construction/grading are to be clearly staked and monitored. All runoff from parking areas as well as the horse corral and wash down areas, is required to be initially directed to grassy swale detention basins and made to terminate at rip-rapped deceleration structures prior to flowing into the Caltrans mitigation site and/or the San Diego River. The required grassy swale is to be sufficiently sized to adequately treat all runoff from the developed site, and consistent with forthcoming City guidelines for Stormwater Best Management Practices (BMP's) as required by the City's Urban Runoff Management Program.

A required removal program of horse manure would discourage the proliferation of the brown-headed cowbird, which is a predator to least Bell's vireo nests, and would reduce the potential fouling of the river waters. To protect the threatened least Bell's vireo and California gnatcatcher, construction and grading activity are prohibited during the breeding season of either bird, if noises from these activities exceed 60 decibels. If

nesting raptors are identified, construction/grading activity would be prohibited until the nesting season is completed, or unless suitable mitigation measures are approved by the program manager of MSCP and the Assistant Deputy Director of the Land Development Review (LDR) Division of the Development Services, Environmental Analysis Section (EAS).

In addition, the final improvement plans are required to show that low intensity lighting is used and that it is shielded and directed away from adjacent MHPA areas, and include the use of signage, fencing, and landscaping to direct park users away from sensitive areas including the adjacent Caltrans mitigation site. Specifically, the use of native vegetation and use of dense tree plantings to buffer the parking lot in the western extent of the project from the Caltrans wetland mitigation site and the adjacent drainage to the west would be required.

Lastly, the installation of a septic system is required to be located such that there would be no direct influent flows into the 100-year floodplain of westerly drainage, the detention basins on site, the Caltrans mitigation site, and/or the San Diego River. Measures are required to be in place to prevent mixture of flows from the leach fields into the runoff detention basins. The design/placement of leach fields shall be approved by Environmental Analysis Section (EAS) and the Multiple Species Conservation Program (MSCP) prior to its submission to the County Health Department for approval.

BE IT FURTHER RESOLVED that, based on the findings hereinbefore adopted by the Hearing Officer, Site Development Permit No. 40-0524 is hereby GRANTED by the Hearing Officer to the referenced Owner/Permittee, in the form, exhibits, terms and conditions as set forth in Permit No. 40-0524, a copy of which is attached hereto and made a part hereof.

JUAN BALIGAD
Development Project Manager
Development Services Department

Adopted on: November 7, 2001

ORIGINAL

APPENDIX B

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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

City of San Diego, CM&FS Div., 9753 Chesapeake Drive, SD CA 92123

Project Name:

Work Order No or Job Order No.

City Purchase Order No.

Resident Engineer (RE):

RE Phone#: Fax#:

Contractor's Name:

Contractor's Address:

Contractor's Phone #:

Contractor's fax #:

Contact Name:

Invoice No.

Invoice Date:

Billing Period: (To)

Item #	Item Description	Contract Authorization				Previous Totals To Date		This Estimate		Totals to Date	
		Unit	Price	Qty	Extension	%/QTY	Amount	% / QTY	Amount	% / QTY	Amount
1					$ -		$ -		$ -	0.00	$ -
2					$ -		$ -		$ -	0.00%	$ -
3					$ -		$ -		$ -	0.00%	$ -
4					$ -		$ -		$ -	0.00%	$ -
5					$ -		$ -		$ -	0.00%	$ -
6					$ -		$ -		$ -	0.00%	$ -
7					$ -		$ -		$ -	0.00%	$ -
8					$ -		$ -		$ -	0.00%	$ -
5					$ -		$ -		$ -	0.00%	$ -
6					$ -		$ -		$ -	0.00%	$ -
7					$ -		$ -		$ -	0.00%	$ -
8					$ -		$ -		$ -	0.00%	$ -
9					$ -		$ -		$ -	0.00%	$ -
10					$ -		$ -		$ -	0.00%	$ -
11					$ -		$ -		$ -	0.00%	$ -
12					$ -		$ -		$ -	0.00%	$ -
13					$ -		$ -		$ -	0.00%	$ -
14					$ -		$ -		$ -	0.00%	$ -
15					$ -		$ -		$ -	0.00%	$ -
16					$ -		$ -		$ -	0.00%	$ -
17	**Field Orders**				$ -		$ -		$ -	0.00%	$ -
					$ -		$ -		$ -	0.00%	$ -
	CHANGE ORDER No.				$ -		$ -		$ -	0.00%	$ -
					$ -		$ -		$ -	0.00%	$ -
	Total Authorized Amount (including approved Change Order)				**$ -**		**$ -**		$ -	**Total Billed**	$ -

SUMMARY

A. Original Contract Amount	$ -
B. Approved Change Order #00 Thru #00	$ -
C. Total Authorized Amount (A+B)	$ -
D. Total Billed to Date	$ -
E. Less Total Retention (5% of D)	$ -
F. Less Total Previous Payments	$ -
G. Payment Due Less Retention	**$0.00**
H. Remaining Authorized Amount	$0.00

I certify that the materials have been received by me in the quality and quantity specified

_____

Resident Engineer

_____

Construction Engineer

Retention and/or Escrow Payment Schedule

Total Retention Required as of this billing (Item E)	$0.00
Previous Retention Withheld in PO or in Escrow	$0.00
Add'l Amt to Withhold in PO/Transfer in Escrow:	***$0.00***
Amt to Release to Contractor from PO/Escrow:	

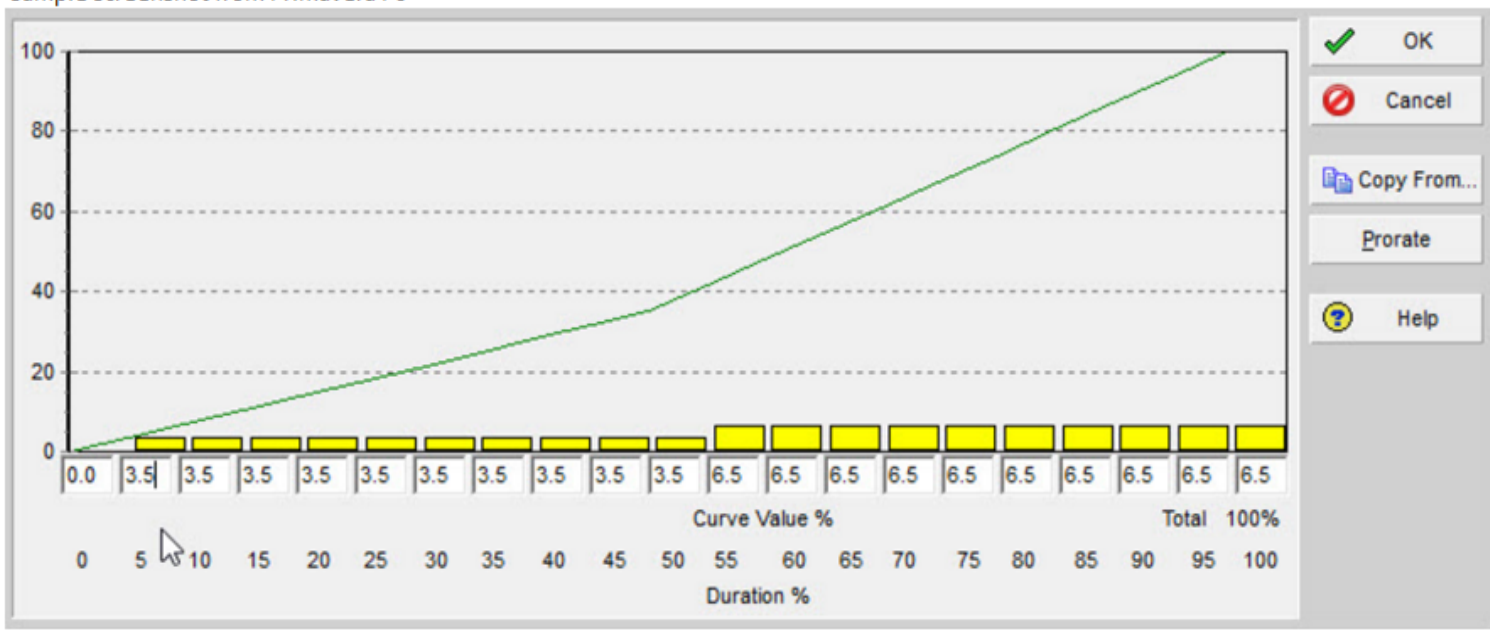
Contractor Signature and Date: _____

Sample Project Spend Curve

Sample Date Entries Required

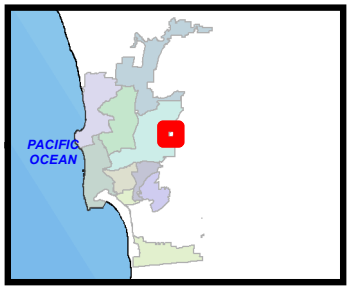
Incremental Curve Value	0.0%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%
Duration % Increment	0%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%

Sample Screenshot from Primavera P6



APPENDIX E

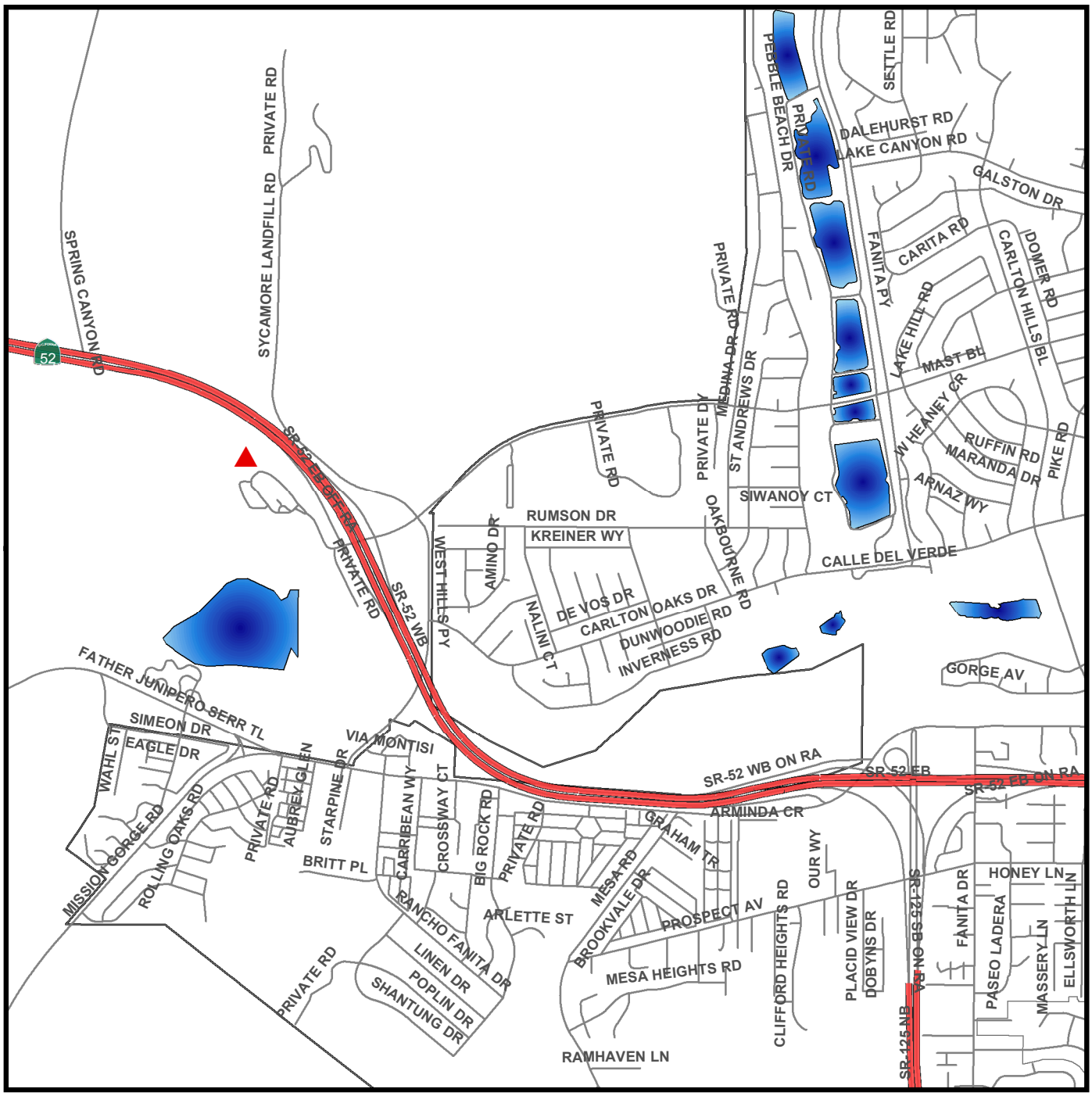
LOCATION MAP



The City of SAN DIEGO Public Works

Mission Trails Field Station

SENIOR ENGINEER	PROJECT MANAGER	PROJECT ENGINEER	FOR QUESTIONS ABOUT THIS PROJECT
Jason Grani	Jorge Acevedo	Marlon Pérez	Call: (619) 533-4207
(619) 533-7525	(619) 533-6657	(619) 533-4658	Email: engineering@sandiego.gov



Legend

▲ S-14016

N
W E
S

COMMUNITY NAME: Tierra Santa

COUNCIL DISTRICT: 7, Scott Sherman

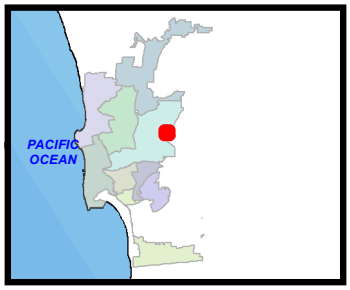
SAP ID: S-14016

Date: 17 August 2016

SanGIS

APPENDIX F

MHPA BOUNDARY MAP



The City of SAN DIEGO Public Works

Mission Trails Canyon Nature Center

MHPA Boundary Map

SENIOR ENGINEER
Jason Grani
(619) 533-7525

PROJECT MANAGER
Jorge Acevedo
(619) 533-6657

PROJECT ENGINEER
Marlon Pérez
(619) 533-4658

FOR QUESTIONS ABOUT THIS PROJECT
Call: (619) 533-4207
Email: engineering@sandiego.gov

Legend

▲ S-14016 MHPA Area

N W E S

COMMUNITY NAME: Tierra Santa

COUNCIL DISTRICT: 7, Scott Sherman

SAP ID: S-14016

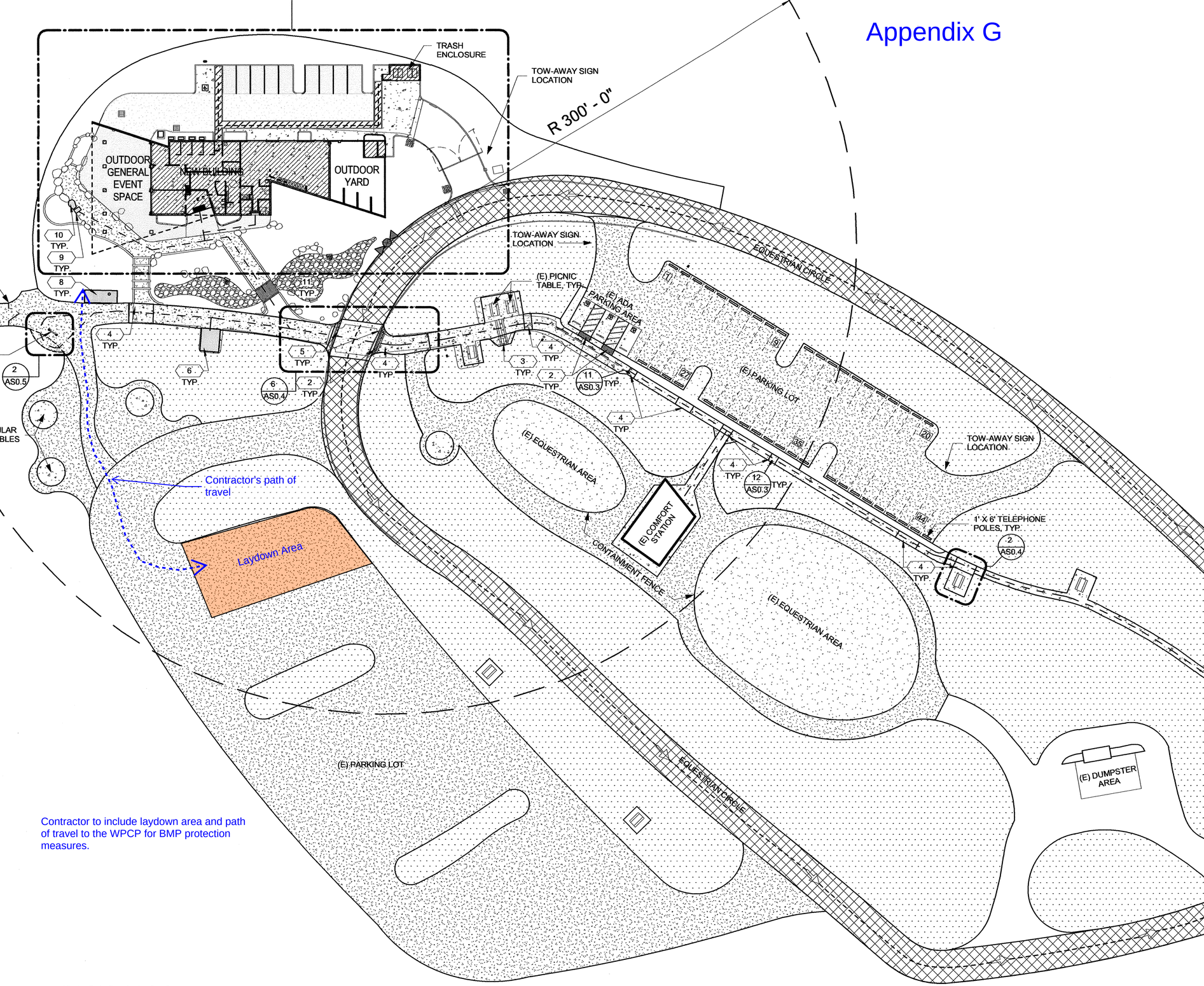
Date: 17 August 2016

SanGIS

APPENDIX G

LAYDOWN AREA MAP

Appendix G



Contractor to include laydown area and path of travel to the WPCP for BMP protection measures.

SCALE : 1" = 40'-0"

APPENDIX H

SAMPLE ARCHAEOLOGY INVOICE

(FOR ARCHAEOLOGY ONLY)
Company Name
Address, telephone, fax

Date: Insert Date

To: Name of Resident Engineer
City of San Diego
Field Engineering Division
9485 Aero Drive
San Diego, CA 92123-1801

Project Name: Insert Project Name

SAP Number (WBS/IO/CC): Insert SAP Number

Drawing Number: Insert Drawing Number

Invoice period: Insert Date to Insert Date

Work Completed: Bid item Number – Description of Bid Item – Quantity – Unit Price– Amount

Detailed summary of work completed under this bid item: Insert detailed description of Work related to Archaeology Monitoring Bid item. See Note 1 below.

Summary of charges:

Description of Services	Name	Start Date	End Date	Total Hours	Hourly Rate	Amount
Field Archaeologist	Joe Smith	8/29/2011	9/2/2011	40	$84	$3,360
Laboratory Assistant	Jane Doe	8/29/2011	9/2/2011	2	$30	$60
Subtotal						$3,420

Work Completed: Bid item Number – Description of Bid Item – Quantity – Unit Price– Amount

Detailed summary of work completed under this bid item: Insert detailed description of Work related to Archaeology Curation/Discovery Bid item. See Note 2 below.

Summary of charges:

Description of Services	Where work occurred (onsite vs offsite/lab)	Name	Start Date	End Date	Total Hours	Hourly Rate	Amount
Field Archaeologist		Joe Smith	8/29/2011	9/2/2011	40	$84	$3,360
Laboratory Assistant		Jane Doe	8/29/2011	9/2/2011	2	$30	$60
Subtotal							$3,420

Total this invoice: $_____

Total invoiced to date: $_____

Note 1:

For monitoring related bid items or work please include summary of construction work that was monitored from Station to Station, Native American monitors present, MMC coordination, status and nature of monitoring and if any discoveries were made.

Note 2:

For curation/discovery related bid items or work completed as part of a discovery and curation process, the PI must provide a response to the following questions along with the invoice:

1. Preliminary results of testing including tentative recommendations regarding eligibility for listing in the California Register of Historical Resources (California Register).

    a. Please briefly describe your application (consideration) of all four California Register criteria.

    b. If the resource is eligible under Criterion D, please define the important information that may be present.

    c. Were specialized studies performed? How many personnel were required? How many Native American monitors were present?

    d. What is the age of the resource?

    e. Please define types of artifacts to be collected and curated, including quantity of boxes to be submitted to the San Diego Archaeological Center (SDAC). How many personnel were required? How many Native American monitors were present?

2. Preliminary results of data recovery and a definition of the size of the representative sample.

    a. Were specialized studies performed? Please define types of artifacts to be collected and curated, including quantity of boxes to be submitted to the SDAC. How many personnel were required? How many Native American monitors were present?

3. What resources were discovered during monitoring?

4. What is the landform context and what is the integrity of the resources?

5. What additional studies are necessary?

6. Based on application of the California Register criteria, what is the significance of the resources?

    a. If the resource is eligible for the California Register, can the resource be avoided by construction?

    b. If not, what treatment (mitigation) measures are proposed? Please define data to be recovered (if necessary) and what material will be submitted to the SDAC for curation. Are any specialized studies proposed?

(After the first invoice, not all the above information needs to be re-stated, just revise as applicable).

APPENDIX I

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

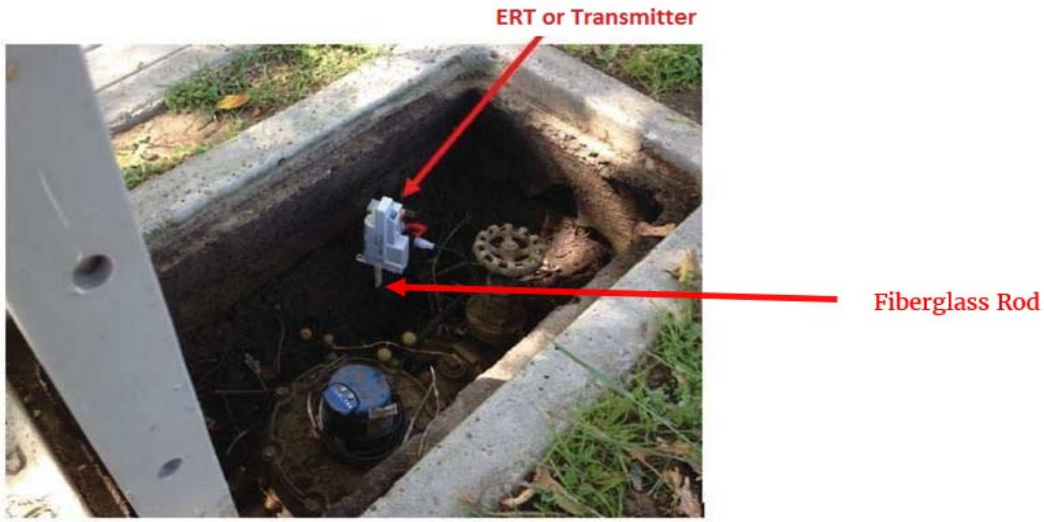


Photo 6 below is an example of disturbance that shall be avoided:

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

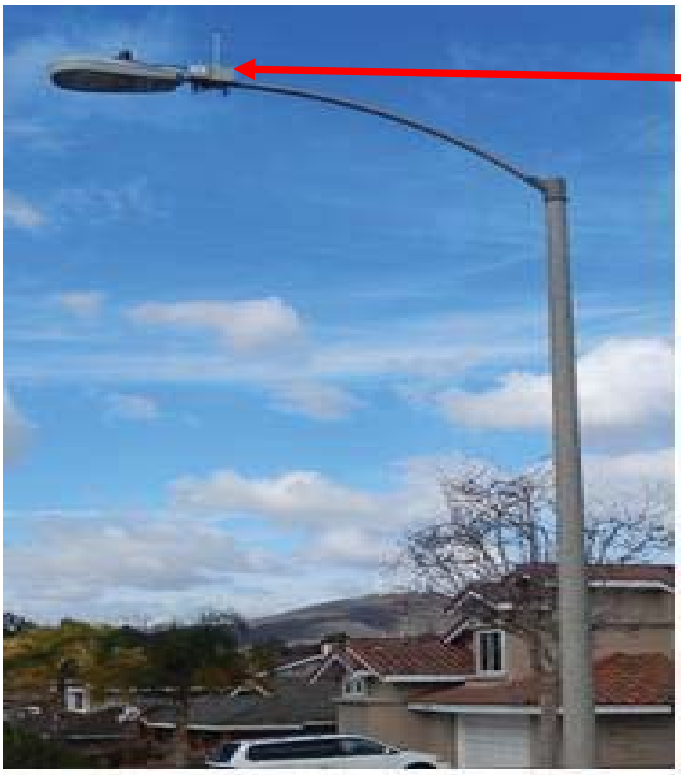


Photo 9

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.

ATTACHMENT F

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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 **Act 1 Construction, Inc.**, herein called "Contractor" for construction of **Mission Trails Field Station East Fortuna**; Bid No. **K-18-1578-DBB-3**; in the amount of **Four Million Nine Hundred Ninety Eight Thousand Dollars and Zero Cents ($4,998,000.00)**, 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 **Mission Trails Field Station East Fortuna**, on file in the office of the Public Works Department as Document No. **S-14016**, 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 **Mission Trails Field Station East Fortuna**, Bid Number **K-18-1578-DBB-3,** 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.

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

By _____

Print Name: Stephen Samara
Principal Contract Specialist
Public Works Contracts

Date: 5/25/2018

APPROVED AS TO FORM

Mara W. Elliott, City Attorney

By _____

Print Name: Bonny Hsu
Deputy City Attorney

Date: 6/5/18

CONTRACTOR

By _____

Print Name: Tiffany Trenholm

Title: VP/Sec.

Date: April 25, 2018

City of San Diego License No.: B2014032126

State Contractor's License No.: 657517

DEPARTMENT OF INDUSTRIAL RELATIONS (DIR) REGISTRATION NUMBER: 1000004899

CERTIFICATIONS AND FORMS

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 certifications, forms and affidavits submitted as part of this bid 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

AMERICAN 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:

Mission Trails Field Station East Fortuna
(Name of Project or Task)

as particularly described in said contract and identified as Bid No. **K-18-1578-DBB-3**; SAP No. (WBS/IO/CC) **S-14016**; 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 SDVOSB①	WHERE CERTIFIED ②	CHECK IF JOINT VENTURE PARTNERSHIP
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.

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 SDVOSB①	WHERE CERTIFIED②
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.

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 forms are submitted as part of the bid submittal

Executed in duplicate

BID BOND

See Instructions to Bidders, Bidder Guarantee of Good Faith
(Bid Security)

KNOW ALL MEN BY THESE PRESENTS,

That Act 1 Construction, Inc. as Principal, and

United Fire & Casualty 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

Mission Trails Field Station East Fortuna, Invitation No. K-18-1578-DBB-3

NOW THEREFORE, if said Principal is awarded a contract by said OWNER and, within the time and in the manner required in the "Notice Inviting Bids" enters into a written Agreement on the form of agreement bound with said Contract Documents, furnishes the required certificates of insurance, and furnishes the required Performance Bond and Payment Bond, then this obligation shall be null and void, otherwise it shall remain in full force and effect. In the event suit is brought upon this bond by said OWNER and OWNER prevails, said Surety shall pay all costs incurred by said OWNER in such suit, including a reasonable attorney's fee to be fixed by the court.

SIGNED AND SEALED, this 1st day of March, 2018

Act 1 Construction, Inc. (SEAL)
(Principal)

By: _____
(Signature)

United Fire & Casualty Company (SEAL)
(Surety)

By: _____
Elba McCullough, Attorney-In-Fact
(Signature)

(SEAL AND NOTARIAL ACKNOWLEDGEMENT OF SURETY)

UNITED FIRE & CASUALTY COMPANY, CEDAR RAPIDS, IA
UNITED FIRE & INDEMNITY COMPANY, WEBSTER, TX
FINANCIAL PACIFIC INSURANCE COMPANY, ROCKLIN, CA
CERTIFIED COPY OF POWER OF ATTORNEY
(original on file at Home Office of Company – See Certification)

Inquiries: Surety Department
118 Second Ave SE
Cedar Rapids, IA 52401

KNOW ALL PERSONS BY THESE PRESENTS, That UNITED FIRE & CASUALTY COMPANY, a corporation duly organized and existing under the laws of the State of Iowa; UNITED FIRE & INDEMNITY COMPANY, a corporation duly organized and existing under the laws of the State of Texas; and FINANCIAL PACIFIC INSURANCE COMPANY, a corporation duly organized and existing under the laws of the State of California (herein collectively called the Companies), and having their corporate headquarters in Cedar Rapids, State of Iowa, does make, constitute and appoint
MICHAEL R. STRAHAN, ELBA MCCULLOUGH, E.B. STRAHAN, EACH INDIVIDUALLY of SAN DIEGO CA

their true and lawful Attorney(s)-in-Fact with power and authority hereby conferred to sign, seal and execute in its behalf all lawful bonds, undertakings and other obligatory instruments of similar nature provided that no single obligation shall exceed $50,000,000.00
and to bind the Companies thereby as fully and to the same extent as if such instruments were signed by the duly authorized officers of the Companies and all of the acts of said Attorney, pursuant to the authority hereby given and hereby ratified and confirmed.

The Authority hereby granted shall expire the 8th day of August, 2018 unless sooner revoked by UNITED FIRE & CASUALTY COMPANY, UNITED FIRE & INDEMNITY COMPANY, AND FINANCIAL PACIFIC INSURANCE COMPANY.

This Power of Attorney is made and executed pursuant to and by authority of the following bylaw duly adopted on May 15, 2013, by the Boards of Directors of UNITED FIRE & CASUALTY COMPANY, UNITED FIRE & INDEMNITY COMPANY, and FINANCIAL PACIFIC INSURANCE COMPANY.

"Article VI – Surety Bonds and Undertakings"

Section 2, Appointment of Attorney-in-Fact. "The President or any Vice President, or any other officer of the Companies may, from time to time, appoint by written certificates attorneys-in-fact to act in behalf of the Companies in the execution of policies of insurance, bonds, undertakings and other obligatory instruments of like nature. The signature of any officer authorized hereby, and the Corporate seal, may be affixed by facsimile to any power of attorney or special power of attorney or certification of either authorized hereby; such signature and seal, when so used, being adopted by the Companies as the original signature of such officer and the original seal of the Companies, to be valid and binding upon the Companies with the same force and effect as though manually affixed. Such attorneys-in-fact, subject to the limitations set forth in their respective certificates of authority shall have full power to bind the Companies by their signature and execution of any such instruments and to attach the seal of the Companies thereto. The President or any Vice President, the Board of Directors or any other officer of the Companies may at any time revoke all power and authority previously given to any attorney-in-fact.

IN WITNESS WHEREOF, the COMPANIES have each caused these presents to be signed by its vice president and its corporate seal to be hereto affixed this 8th day of August, 2016

UNITED FIRE & CASUALTY COMPANY
UNITED FIRE & INDEMNITY COMPANY
FINANCIAL PACIFIC INSURANCE COMPANY

By: Dennis J. Richmann
Vice President

State of Iowa, County of Linn, ss:
On 8th day of August, 2016, before me personally came Dennis J. Richmann
to me known, who being by me duly sworn, did depose and say; that he resides in Cedar Rapids, State of Iowa; that he is a Vice President of UNITED FIRE & CASUALTY COMPANY, a Vice President of UNITED FIRE & INDEMNITY COMPANY, and a Vice President of FINANCIAL PACIFIC INSURANCE COMPANY the corporations described in and which executed the above instrument; that he knows the seal of said corporations; that the seal affixed to the said instrument is such corporate seal; that it was so affixed pursuant to authority given by the Board of Directors of said corporations and that he signed his name thereto pursuant to like authority, and acknowledges same to be the act and deed of said corporations.

Judith A. Davis
Iowa Notarial Seal
Commission number 173041
My Commission Expires 04/23/2018

Judith A Davis
Notary Public
My commission expires: 04/23/2018

I, David A. Lange, Secretary of UNITED FIRE & CASUALTY COMPANY and Assistant Secretary of UNITED FIRE & INDEMNITY COMPANY, and Assistant Secretary of FINANCIAL PACIFIC INSURANCE COMPANY, do hereby certify that I have compared the foregoing copy of the Power of Attorney and affidavit, and the copy of the Section of the bylaws and resolutions of said Corporations as set forth in said Power of Attorney, with the ORIGINALS ON FILE IN THE HOME OFFICE OF SAID CORPORATIONS, and that the same are correct transcripts thereof, and of the whole of the said originals, and that the said Power of Attorney has not been revoked and is now in full force and effect.

In testimony whereof I have hereunto subscribed my name and affixed the corporate seal of the said Corporations this 1st day of March 2018

By: David A. Lange
Secretary, UF&C
Assistant Secretary, UF&I/FPIC

ACKNOWLEDGMENT

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 March 1st, 2018 before me, E.B. Strahan, Notary Public
(insert name and title of the officer)

personally appeared Elba McCullough,
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 _____ (Seal)

E. B. STRAHAN
Commission # 2069654
Notary Public - California
San Diego County
My Comm. Expires Jun 25, 2018

CALIFORNIA CERTIFICATE OF ACKNOWLEDGMENT

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 Riverside)

On March 05, 2018 before me, Cheri L. Bower, Notary Public
(here insert name and title of the officer)

personally appeared Tiffany Trenholm ----------

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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.

CHERI L. BOWER
COMM. #2122568
Notary Public - California
Riverside County
My Comm. Expires Aug. 8, 2019

Signature Cheri L. Bower, Notary Public

(Seal)

Optional Information

Although the information in this section is not required by law, it could prevent fraudulent removal and reattachment of this acknowledgment to an unauthorized document and may prove useful to persons relying on the attached document.

Description of Attached Document

The preceding Certificate of Acknowledgment is attached to a document titled/for the purpose of Bid Bond Mission Trails Field Station East Fortuna, containing 1 page(s) and dated March 1, 2018.

The signer(s) capacity or authority is/are as:

- ☐ Individual(s)
- ☐ Attorney-in-Fact
- ☒ Corporate Officer(s) VP/Sec
  Title(s)
- ☐ Guardian/Conservator
- ☐ Partner - Limited/General
- ☐ Trustee(s)
- ☐ Other:

representing: Act 1 Construction, Inc.
Name(s) of Person(s) or Entity(ies) Signer is Representing

Additional Information

Method of Signer Identification

Proved to me on the basis of satisfactory evidence:
☒ form(s) of identification ○ credible witness(es)

Notarial event is detailed in notary journal on:
Page # _____ Entry # _____

Notary contact: _____

Other

☐ Additional Signer(s) ☐ Signer(s) Thumbprint(s)

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
		n/a			

Contractor Name: Act 1 Construction, Inc.

Certified By Tiffany Trenholm (Name) Title VP/Sec.

(Signature) Date April 11, 2018

USE ADDITIONAL FORMS AS NECESSARY

Mandatory Disclosure of Business Interests Form

BIDDER/PROPOSER INFORMATION

Act 1 Construction
Legal Name DBA

444 Sixth Street Norco CA 92860
Street Address City State Zip

Tiffany Trenholm 951.735-1184 951.737.5342
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.

Dan W Trenholm President
Name Title/Position

Norco CA
City and State of Residence Employer (if different than Bidder/Proposer)

50% owner
Interest in the transaction

Tiffany A. Trenholm VP, Sec.
Name Title/Position

Norco CA
City and State of Residence Employer (if different than Bidder/Proposer)

50% owner
Interest in the transaction

Jennifer E. Trenholm
Name Title/Position

Norco CA Administrative Assistant
City and State of Residence Employer (if different than Bidder/Proposer)

Authorized Signer for Act 1
Interest in the transaction

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

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

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 Purchasing Agent with written notice is grounds for Contract termination.

Tiffany Trenholm VP, Sr. [signature] 4.25.18

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.

City of San Diego

CITY CONTACT: Brittany Friedenreich. **Contract Specialist, Email**: BFriedenreic@sandiego.gov
Phone No. (619) 533-3104

ADDENDUM A

e - Bidding

FOR

MISSION TRAILS FIELD STATION EAST FORTUNA

BID NO.:	**K-18-1578-DBB-3**
SAP NO. (WBS/IO/CC):	**S-14016**
CLIENT DEPARTMENT:	**1714**
COUNCIL DISTRICT:	**7**
PROJECT TYPE:	**BH**

BID DUE DATE:

2:00 PM
FEBRUARY 21, 2018
CITY OF SAN DIEGO
PUBLIC WORKS CONTRACTS
525 B Street, Suite 750, MS 908A
SAN DIEGO, CA 92101

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. The Pre-Bid Meeting for this project, scheduled for January 30, 2018 at 10:00 AM, has been cancelled and will not be rescheduled.

C. NOTICE INVITING BIDS

1. To Item 8, Pre-Bid Meeting, page 5, Sub item 8.1, **DELETE** in its entirety.

2. To Item 10, Submission of Questions, page 5, Sub item 10.1., **DELETE** in its entirety and **SUBSTITUTE** with the following:

10. SUBMISSION OF QUESTIONS:

10.1. The Director (or Designee) of Public Works Department is the officer responsible for opening, examining, and evaluating the competitive Bids submitted to the City for the acquisition, construction and completion of any public improvement except when otherwise set forth in these documents. 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

James Nagelvoort, Director
Public Works Department

Dated: *February 6, 2018*
San Diego, California

JN/RWB/Lad

City of San Diego

CITY CONTACT: Brittany Friedenreich, **Contract Specialist, Email**: BFriedenreic@sandiego.gov
Phone No. (619) 533-3104

ADDENDUM B

e - Bidding

FOR

MISSION TRAILS FIELD STATION EAST FORTUNA

BID NO.: **K-18-1578-DBB-3**
SAP NO. (WBS/IO/CC): **S-14016**
CLIENT DEPARTMENT: **1714**
COUNCIL DISTRICT: **7**
PROJECT TYPE: **BH**

BID DUE DATE:

2:00 PM
FEBRUARY 28, 2018
CITY OF SAN DIEGO
PUBLIC WORKS CONTRACTS
525 B STREET, SUITE 750, MS 908A
SAN DIEGO, CA 92101

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.

THE SUBMITTAL DATE FOR THIS PROJECT HAS BEEN **EXTENDED AS STATED ON THE COVER PAGE.**

James Nagelvoort, Director
Public Works Department

Dated: *February 12, 2018*
San Diego, California

JN/RWB/mlw

City of San Diego

CITY CONTACT: Brittany Friedenreich, **Contract Specialist, Email**: BFriedenreic@sandiego.gov
Phone No. (619) 533-3104

ADDENDUM C

e - Bidding

FOR

MISSION TRAILS FIELD STATION EAST FORTUNA

BID NO.: **K-18-1578-DBB-3**
SAP NO. (WBS/IO/CC): **S-14016**
CLIENT DEPARTMENT: **1714**
COUNCIL DISTRICT: **7**
PROJECT TYPE: **BH**

BID DUE DATE:

2:00 PM
MARCH 9, 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:

2.15.18

1) Registered Architect — Date

Seal:

02/14/2018

2) For City Engineer — Date

Seal:

A. CHANGES TO CONTRACT DOCUMENTS

The following changes to the Contract Documents are hereby made effective as though originally issued with the bid package. Bidders are reminded that all previous requirements to this solicitation remain in full force and effect.

THE SUBMITTAL DATE FOR THIS PROJECT HAS BEEN **EXTENDED AS STATED ON THE COVER PAGE.**

B. BIDDER's QUESTIONS

Q1. Please specify a fixture call out or detail drawing for the roof drains (A1.3)

A1. See revised sheet A1.3.

Q2. Also i'm not seeing any Storm Drain piping from the drains themselves to where they connect to the site storm drains shown on C-3.

A2. See revised sheet A2.0.

Q3. Spec section 221423 - STORM DRAINAGE PIPING SPECIALTIES also makes no note of a model to be used for the roof drains.

A3. See revised sheet A5.2.

Q4. The FMND item #6 talks about removal of horse manure four days each week. Please confirm this removal process is NOT a requirement of the contractor but part of the park rangers.

A4. Not required by General Contractor.

Q5. Item #8 states "No clearing, grubbing, grading, or building activities would be permitted to occur during the breading season if noise exceeds 60DB (March 15 to September 15). Most construction activities are above 60DB. Please confirm if construction can occur between March and September.

A5. Yes, construction may occur during the breeding season for least Bell's vireo (March 15 to September 15) if this sensitive avian species is not present following implementation of U.S. Fish and Wildlife Service protocol survey requirements as specified in Mitigated Negative Declaration LDR No. 40-0524 Mitigation Monitoring and Reporting Program (MMRP) prior to construction to confirm presence/absence of

this species. If absent, no noise attenuation measures are required unless the Project Biologist later observes during monitoring of construction activities that least Bell's vireo is now present. If present, construction may continue if the Project Biologist and acoustician confirm appropriate noise attenuation measures have been provided (e.g. noise walls) that reduce noise levels to 60dB or below prior to commencing with construction activities in areas defined by the Project Biologist as sensitive for least Bell's vireo.

Q6. Item #10 states "No clearing, grubbing, grading, or building activities would be permitted to occur during the breading season if noise exceeds 60DB (March 1 to August 15). Please confirm if construction can occur between March and August.

A6. Yes, construction may occur during the breeding season for California gnatcatchers (March 1 to August 15) if this sensitive avian species is not present following implementation of U.S. Fish and Wildlife Service protocol survey requirements as specified in Mitigated Negative Declaration LDR No. 40-0524 Mitigation Monitoring and Reporting Program (MMRP) prior to construction to confirm presence/absence of this species. If absent, no noise attenuation measures are required unless the Project Biologist later observes during monitoring of construction activities that California gnatcatcher(s) is now present. If present, construction may continue if the Project Biologist and acoustician confirm appropriate noise attenuation measures have been provided (e.g. noise walls) that reduce noise levels to 60dB or below prior to commencing with construction activities in areas defined by the Project Biologist as sensitive for California gnatcatcher.

Q7. Item #12 states "In order to avoid indirect impacts to nesting raptors in the project vicinity, construction/ grading during the raptors breeding season (December 1 to June 30) shall be avoided. If nesting raptors are identified, construction activity shall not be allowed". Please confirm if construction can occur between December and June.

A7. Mitigated Negative Declaration LDR No. 40-0524 MMRP specifically states, "In order to avoid indirect impacts to nesting raptors in the project vicinity, construction/grading during the raptors breeding season (December 1 to June 30) shall be avoided unless a survey is conducted by a qualified biologist to confirm that no nesting raptors are located (within) 500 feet of the construction/grading area. If

nesting raptors are identified, construction/grading activity shall not be allowed until the nesting season is completed, or unless suitable mitigation measures are approved by the project manager of MSCP and the Assistant Deputy Director of LDR/EAS." The Project Biologist will be required to conduct pre-construction nesting surveys within 10 days prior to the start of the breeding season (December) or anytime thereafter if construction commences during the breeding season. If nesting raptors are observed within 500 feet of any limits of work, the MMRP must be followed and no work can commence within 500 feet of the nest until such time as the nesting activities conclude and young fledge per confirmation from the Project Biologist.

Q8. Specification section 5. 6-3.2.1.1.3 "Contractor will be responsible for supplying & installing sound/visual mitigation measures IF the Biological monitor is to determine that construction activities exceed the ambient noise levels". This item cannot be quantified as we have no way to know what mitigation measures a Biologist will request. Please provide an allowance to cover this item or make it part of the Field Orders allowance.

A8. Contractor must consult with their Project Biologist to determine a reasonable allowance for noise attenuation. Please note, an acoustician will need to confirm the noise attenuation reduces construction noise levels to a maximum of 60dB as specified in the MMRP, and regular noise monitoring will be required if species are present to evaluate during construction if the 60 dB noise levels are not being exceeded. See revised Bid list.

Q9. Detail 4/L1.2 calls for base under DG per Civil. Civil drawings call for DG per landscape drawings. Detail 2A/L1.2 shows 4" DG over 3" aggregate. Detail 4/L1.2 shows 12" section of DG and base. If the DG is 4" then the base in detail 4 would be 8", but detail 2A is showing 3".Please clarify the base thickness under the Decomposed Granite.

A9. See revised sheets C-4 & C-6.

Q10. Detail 1.L1.2 calls for aggregate base per geotechnical report and shows a section of base at 2' deep. The geotechnical report has base depths for asphalt or concrete but not permeable pavers. Please clarify if the base under the permeable pavers is 2' thick.

A10. See revised sheets C-4 & C-6.

Q11. The bid form line item #8 “Furniture, Fixtures and Equipment” are called out as an allowance. Under section 9 “Measurement and Payment” of the technical specifications it states “Bid item for Furniture, Fixtures and Equipment shall include all items as specified in Appendix C”. Appendix C had furniture and Residential Appliances. Spec 113100 calls out for appliances but they are different from the ones in Appendix C. Please clarify bid item #8 is an allowance to include all items in Appendix C, and residential appliances called out in spec 113100.

A11. Bid Item # 8 includes the FF&E list, as well as the appliances in spec 113100.

Q12. Finish schedule shows a tongue and grove ceiling in 3 rooms. It does not provide species of wood. Please provide information on the wood ceiling including finish.

A12. See revised sheets A1.3, A2.0 & A5.2.

Q13. Wall section 2/A3.2 shows T&G over 2x framing at the 7’-4” height on the CMU wall but shows it as metal framing. Please clarify metal framing is correct in this location.

A13. See revised sheets A1.3, A2.0 and A5.2.

Q14. I was wondering if there is a Geotechnical Report available for the Mission Trails Field Station. Thank you for your help on this.

A14. Geotechnical Report may be found in Attachment E, Section 2-7.5 of the original solicitation documents or by visiting: https://filecloud.sandiego.gov/url/7qq54sb7xp42pa32

Q15. Drawing E2.0 key note “U6” shows existing pull box for Telecom & Cable TV POC. Drawing C-5 shows a communications trench with no information about the trench or any conduits in it.

Please clarify this communications trench in Equestrian Circle is by AT&T or others. If not please provide details.

A15. General Contractor to install a 4” Duct per AT&T’s Specifications and to follow City Standard Drawings SDG-107, SDG-117, SDG-155, SDG-109, SDG-156, G-10. OSP cable by service provider.

Q16. Door schedule for Type F doors shows a glass lite but does not specify what type, thickness of glass. Please clarify if door 101C, 103A, 106, 108, 118, get glass and if so what type of glass.

A16. Doors 101C 103A, 106 and 118 to receive ¼" clear tempered glass. Door 108 does not have glass.

Q17. Door 117C is a Type D door with no glass but the exterior elevations on A2.0 and detail 9/A4.2 shows a storefront door with full glass. Please clarify the type of door and the glass requirements.

A17. Door 117C to be door type A as shown in Elevations.

Q18. Item #5.9 on A3.1 calls detail 1/A8.3 but that is for gypsum. Please provide details for the railing and gates.

A18. Please read 1/A8.4.

Q19. Detail 1/AS0.5 shows precast plank and what looks like a metal plate and a weld symbol. It does not specify thickness of metal plate and any anchor or any detail. Please provide the details for this attachment.

A19. Provide 6" x 6' x ¼" plate at each plank.

Q20. Section B of 1/AS0.5 states conc planks per struct. Swgs. There are no structural drawings for these planks. Please provide structural drawings.

A20. The note should refer to the structural info in 1/ AS0.5 A & B.

Q21. Detail 2/AS0.5 Kiosk Modification, is not called out on the drawings. Please clarify what work is to be done, provide details, and where it is located on the site.

A21. The kiosk is located, and the detail referenced on the left side of Sheet G2.1.

Q22. Drawing Page L1.0 calls for Corten Steel edger see detail 1/ L1.2. This detail calls for ¼" Galvanized steel edge. Please clarify the edging material for this project.

A22. Provide the Corten Steel Ledger.

Q23. Specification section 28 31 11 DESIGN/BUILD FIRE ALARM states that the main control panel shall be equal to a Notifier by Honeywell AFP-200. According to the Notifier website the AFP-200 has been discontinued. Please confirm that a S3 addressable control panel manufactured by Gamewell-FCI by Honeywell is an acceptable equal to the AFP-200.

A23. Per the City of San Diego Facilities standards, (Section 4.4.4.D) use only Edwards, Notify, or Simplex fire alarms.

Q24. Sheet E3.0 shows a security panel, but no specification or any other devices have shown on the plans. Please confirm if the security system is a design build effort by the contractor as well as any other requirements regarding the security system.

A24. The security panel shown in the plans is a 'placeholder' so that we could assign it a 120V power circuit. The security system and devices would presumably be specified by the design-build.

Q25. The plans indicate the routing of the communication duct bank, but does not show any fiber optic or copper cabling being installed. Please confirm that all ISP and OSP fiber optic and copper cabling will be provided by Service Provider and not included in the contract.

A25. General Contractor to provide trench and conduit per AT&T's standards. OSP cable by service provider.

Q26. Drawing C-3 notes that the Electrical Conduit required to be ran from the Tank Alarm Controller to the Solenoid Controlled shut of valve is by others. Please confirm what portion of work is by others. Is the conduit required to be installed by the Contractor? If so, please verify quantities and sizes of conduit.

A26. This scope of work is part of General Contractor.

Q27. Drawing C-5 requires a new communication trench be installed from two existing pull boxes; located on Equestrian Circle. Details C-5/A.A and C-5/B.B both state to see electrical drawings for detail. The electrical drawings do not refer to this scope of work. Please provide a detail showing the required conduit size and quantities required for the communication trench. Please confirm that the OSP copper cable

/ fiber optic cabling; associated with this trench line, is to be procured/installed by others.

A27. General Contractor to install a 4" Duct per AT&T's Specifications and to follow City Standard Drawings SDG-107, SDG-117, SDG-155, SDG-109, SDG-156, G-10. OSP cable by service provider.

Q28. The specs require AWI Compliance Certifications which lowers the casework subcontractor pool. Would the City be open to doing certifications through the Woodwork Institute instead?

A28. Yes.

Q29. Please provide a Roofing Specification for the Single Ply Roofing as noted by note 3 on Drawing A1.3.

A29. See added Spec Section 075419.

Q30. The Electrical Drawings make no reference to power requirements for the building Fire/Smoke dampers. If power requirements are needed for the SFD, please revise the electrical drawings to show circuitry and location.

A30. There are no Fire/Smoke dampers on this project.

Q31. Specification 26 27 26 / 2.1 H – States that temper proof receptacles are required in all Public Areas. Please confirm what areas are considered "Public Areas"

A31. Interior Public Areas include Lobby Rm 100 and Meeting Rm 101. Exterior Public Areas will include the canopy space (GL A to B), and public restrooms Room 115, 116.

Q32. Specification 26 27 26 / 2.1 G – States to use a DR20TR for all Temper Proof Decora Type Receptacles. Specification 26 27 26 / 2.1 H – States to use a HBL 8300SGA for all Receptacles located in public areas.

A32. See added Spec Section 075419.

Q33. Please provide a Sonneman part number for the L11 Type Fixture. The information shown on the Fixture Schedule is insufficient for bidding purposes.

A33. See revised Spec Section 105113.

Q34. Clarification is needed to the type of lock is needed for the lockers. It is noted that the locks should have padlocks, built-in combination locks, built-in card operated locks. You can't have all three and all three are vastly different in cost.

A34. See revised Spec Section 105113.

Q35. There are no specification on the single ply roof. Please provide specifications

A35. See revised Spec Section 075419.

Q36. Several areas of the plans and specs refer to a soils report. I do not see one included with the Construction Docs. I see where the plans call for over-excavation, but I do not know if the existing excavated soils will be suitable for use as backfill. I would assume the soils report will clarify that. Thus, I am requesting to review the report.

A36. See A14 per this Addendum C.

Q37. Please provide the type of acoustical ceiling tile for this project. The spec does not provide a type, color, etc.

A37. 2'-0" x 2'-0", Armstrong "Fine Fissured" lay in ceiling tiles.

C. SUPPLEMENTARY SPECIAL PROVISIONS

1. To Attachment E, Section 6 – Prosecution, Progress and Acceptance of Work, page 37, Sub-section 6-3.2.2, Archaeological and Native American Monitoring Program, **DELETE** in its entirety.

2. To Attachment E, Section 802 – Native Habitat Protection, Installation, Maintenance, and Monitoring, page 45, Sub-section 802-2.1, Project Biologist, item 5, **DELETE** in its entirety and **SUBSTITUTE** with the following:

    5. The Contractor will retain a qualified Project Biologist to perform biological monitoring work for this Contract. You shall coordinate your activities and Schedule with the activities and schedules of the Project Biologist.

3. To Attachment E, Technical Specifications, Table of Contents, pages 48 through 52, **DELETE** in their entirety and **SUBSTITUTE** with the following pages 40 through 44 of this Addendum.

4. To Attachment E, Technical Specifications, Division 7 – Thermal and Moisture Protection, **ADD** Section 075419 – Polyvinyl-Chloride (PVC) Roofing, pages 45 through 56 of this Addendum.

5. To Attachment E, Technical Specifications, Division 9 – Finishes, Section 099113 – Exterior Painting, pages 393 through 400, **DELETE** in their entirety and **SUBSTITUTE** with pages 57 through 64 of this Addendum.

6. To Attachment E, Technical Specifications, Division 9 – Finishes, Section 099123 – Interior Painting, pages 401 through 406, **DELETE** in their entirety and **SUBSTITUTE** with pages 65 through 70 of this Addendum.

7. To Attachment E, Technical Specifications, Division 9 – Finishes, Section 099300 – Staining and Transparent Finishing, pages 407 through 413, **DELETE** in their entirety and **SUBSTITUTE** with pages 71 through 77 of this Addendum.

8. To Attachment E, Technical Specifications, Division 10 – Specialties, Section 105113 – Metal Lockers, pages 437 through 446, **DELETE** in their entirety and **SUBSTITUTE** with pages 78 through 84 of this Addendum.

9. To Attachment E, Technical Specifications, Division 11 – Equipment, Section 113100 – Residential Appliances, pages 447 through 449, **DELETE** in their entirety and **SUBSTITUTE** with pages 85 through 87 of this Addendum.

10. To Attachment E, Technical Specifications, Division 28 – Electronic Safety and Security, Section 283111 – Design-Build Fire Alarm, pages 802 through 808, **DELETE** in their entirety and **SUBSTITUTE** with pages 88 through 94 of this Addendum.

11. To Attachment E, **ADD** Appendix J – AT&T Specifications, pages 13 through 39 of this Addendum.

D. ADDITIONAL CHANGES

1. The following are additional changes to the Line Items in the PlanetBids Tab:

   For clarity where applicable, **ADDITIONS**, if any, have been **Underlined** and **DELETIONS**, if any, have been ~~**Stricken out.**~~

Section	Item Code	Description	UoM	Quantity	Payment Reference	Unit Price
~~Main Bid Item~~	~~541690~~	~~Archaeological Monitoring Program~~	~~LS~~	~~1~~	~~6-3.2.2.1~~	
Main Bid Item	541330	Biological Monitoring and Reporting	LS	1	802-5	

E. PLANS

1. To Drawings numbered 39038-1-D, 39038-5-D through 39038-8-D, 39038-10-D, 39038-20-D, 39038-22-D through 39038-23-D, 39038-26-D, and 39038-35-D, **DELETE** in their entirety and **REPLACE** with pages 95 through 105 of this Addendum.

James Nagelvoort, Director
Public Works Department

Dated: *February 21, 2018*
San Diego, California

JN/RWB/mlw

APPENDIX J

AT&T SPECIFICATIONS

AT&T Specifications

Trenching

Conduit

Boxes and Manholes

Aerial Entrance Masts

Service Cabinets

Bonding and Grounding

A Guide for California Developers of Commercial Property

This guide consists of AT&T California specifications and diagrams for trenching, underground support structure, aerial installations, and other make ready work performed by developers and their agents as required by AT&T for installation of its copper communication facilities on commercial private property. Any deviation from the information provided in this document must be approved by the local AT&T Engineer.

TABLE OF CONTENTS

AT&T Planning and Design Requirements

The California Public Utility Commission Tariff Schedule A2 defines specific responsibilities for both the Developer and AT&T to establish telephone service to your project. AT&T must approve the final plan for service prior to the start of construction for the telephone facilities. In order for AT&T to begin engineering to serve your project you must provide the following:

1. **Two (2) scaled copies of the site plan, floor plan and electrical/telephone site plan (E-1) drawings *(AT&T Engineer may request your plans on a Compact Disk in lieu of hard copies)***
2. **Two (2) scaled copies of off-site improvement plans**
3. **Address, telephone number and Email address of Developer/Owner, General Contractor, Electrical Consultant, and Electrician**
4. **Assessor Parcel Number and address of project**
5. **Approved parcel map issued by the governing municipality**
6. **Power company trench layout**

After receipt of these items, AT&T will return to you a red-lined CD or scaled copy of your plans indicating the trench route and substructure requirements and a Service Connection Agreement Letter. This letter must be signed and returned prior to any detailed engineering work by AT&T.

In order to best serve the telecommunication needs of you and your tenants, if available, please provide AT&T with the estimated number of voice, data, and facsimile lines for each commercial building. For advanced services, include estimated high speed data (T1) and fiber based services (DS3 and above).

General Construction Requirements

1. **Contact AT&T at [insert phone no.] at least [no.] days prior to construction to arrange a pre-construction meeting date.**

2. **Notify AT&T on [insert phone no] at least 48 hours prior to trenching to ensure an AT&T Inspector will be on site, if required.**

3. **Verify the location of AT&T and all other utility substructures and buried facilities two (2) days prior to excavation.**
   Call Underground Service Alert:

   811

4. **Provide supervision and coordination between the various contractors working within the project in order to prevent damage to AT&T facilities. The developer is responsible for the cost of repairs, replacement or relocation made necessary by damage to the AT&T facilities by other work operations.**

5. **Construct trench and place substructures according to AT&T plans and specifications.**

6. **Request and get authorization for any design change from the AT&T engineer or AT&T inspector prior to implementing the change.**

7. **Provide "As Built" drawings with the footages to the AT&T engineer or AT&T inspector upon completion of the conduit system.**

8. **Call [insert phone no.] for inspection of building requirements at least [insert no.] days prior to needing telephone service, including temporary alarm circuits.**

9. **AT&T facilities will not be placed until all developer requirements are completed to AT&T specification and meet AT&T approval.**

Trenching

1. **Minimum radial clearance must be 12" from all trench occupants except CATV (C.P.U.C. Order 128), unless there is a prior signed agreement with AT&T.**

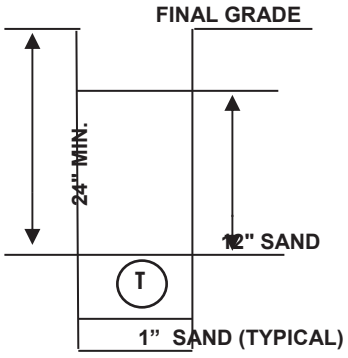
2. **Bends, sweeps or grade changes that have a radius of 80' or less or a grade change of 20% or more must be encased in 2500 psi concrete.**

3. **Minimum trench cover must meet the governing agency requirement and Cal P.U.C. GO 128.**

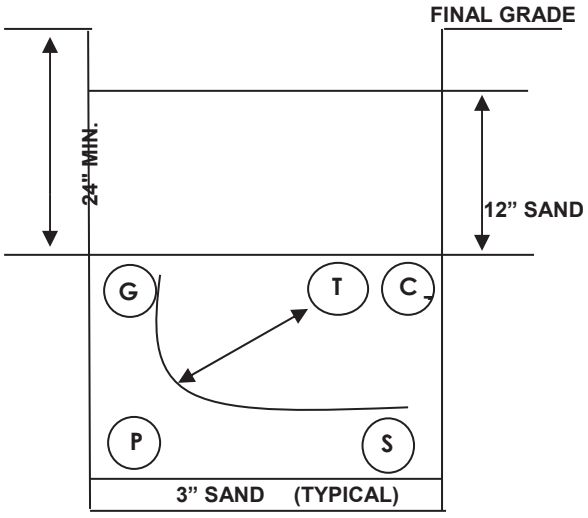
4. **All trench backfill material must be minimum Class B and compacted in accordance with governing agency specifications. Cover conduit with 12" of fine soil (import) before tamping.**

5. **Stake property corner for AT&T tie-in from the dedicated street or easement.**

TELCO (AT&T) ONLY TRENCH



JOINT TRENCH



(T) Telephone (G) Gas (P) Primary (S) Secondary (C) Cable

Conduit

Conduit placed for AT&T must be for its exclusive use. AT&T will not occupy the same conduit with other utilities or foreign cable/communication systems. AT&T may refuse to occupy conduit that deviates from our plans and specifications. AT&T will specify the number and size of conduits for your project.

The developer is responsible for repairing or resolving any problems with the conduit they have installed that prevents AT&T from pulling its cable through the conduit using normal installation methods. All conduit sections must be rodded, cleared, and roped prior to AT&T pulling in cable. Mandrelling of conduit may be required.

If the job calls for AT&T to provide the conduit material to the job site, the developer or his/her agent must be on site to sign for the delivery.

<u>Material Requirements</u>

The supplier AT&T uses for PVC conduit, fittings and accessories is Cantexl. Their main telephone number is 817-215-7000. They can also be contacted through their website at www.cantexinc.com. Suppliers/Distributors are listed on page 9.

1. **Four inch (4") conduit must be type C PVC, white in color with "AT&T" logo.**
    - **Minimum sweep for 4" conduit is three (3) ft 90 degree radius.**
    - **Maximum of two (2) 90 degree bends**
    - **Three-eighth inch (3/8") minimum polypropylene pull rope or equivalent strength Polyester Woven Mule Tape must be installed in terminated conduit end to end. Leave a minimum of 3' of secured rope in each box. Ropes must be one continuous length for each section and to the terminal room in the building (no tying or splicing of rope).**

2. **Two inch (2") conduit must be type DB 60 rigid plastic.**
    - **Minimum sweep for 2" conduit is two (2) ft 90 degree radius.**
    - **Maximum of two (2) 90 degree bends**

- **Three-sixteenth inch (3/16") minimum polypropylene pull rope or equivalent strength Polyester Woven Mule Tape must be installed in terminated conduit end to end.**
- **Leave a minimum of 3' of secured rope in each box. Ropes must be one continuous length for each section and to the terminal room in the building (no tying or splicing of rope).**

3. **Rigid plastic or steel conduit must be used in floor slabs.**

4. **Condulets, plumber's fittings, water and gas pipes are <u>NOT ACCEPTABLE</u>.**

5. **Aerial installations require a 2" steel conduit and approved weather head fitting. See diagrams on pages 18 and 19.**

<u>Installation Requirements</u>

1. **Minimum trench coverage is detailed on page 5.**

2. **Service conduit (2" or 4") must be terminated above distribution conduits (4") in the box to prevent water flowing from the box and down service conduit toward the building. Boxes must be ordered with the appropriate number of knockouts or terminators to accommodate the conduits.**

3. **Wall to wall measurements of terminated conduit between boxes and to the terminal room in the building is required (use Logan's line, Tru Tape®, mule or steel tape). Lengths must be included in the "As-Builts" and a copy provided to AT&T prior to installation of AT&T's cable.**

4. **Conduit in multiple duct designs must be installed using AT&T approved spacers.**

5. **Concrete encase (2500 psi) all bends with less than 80' radius.**

6. ***A maximum of two (2) 90 degree bends per section may be installed unless otherwise approved by AT&T.* Pull boxes may be required. Straight 20' lengths may be used on 90 degree bends with a radius greater than 40'. Factory bends are required for all other bends.**

7. **Underground entrance conduit in a building must terminate 2" above the floor. The terminal room should be planned so that AT&T's entrance cable WILL NOT EXCEED 50' beyond the point where it enters the building.**

8. **Rope all conduits (see material requirements on page 6). Use a temporary universal plug to keep conduit free of debris. Cap all stubbed conduit.**

Boxes and Manholes

Material Specifications

All pull boxes, splice boxes and manholes placed by the developer that will be owned and maintained by the property owner must be approved for use by AT&T. The developer may purchase from any manufacturer that meets AT&T's specifications for boxes and manholes, and must include the appropriate racking, sump, bolt down cover, and pulling eyes. Boxes and manholes owned by the property owner must have a generic telephone emblem on the lid. The use of AT&T's name or logo is not permitted on a property owner's boxes and manholes.

1. **The manufacturer AT&T uses for plastic or polymer boxes is NewBasis. Boxes installed for AT&T use that are 30" x 60" or smaller must be plastic or polymer. The main number for New Basis is 951-787-0600. They can also be contacted through their website at www.newbasis.com .**

2. **The manufacturer AT&T uses for concrete boxes and manholes is Utility Vault (Oldcastle) for (LA south) and Teichert Precast for (Bakersfield north). Contact information for Utility Vault's and Teichert Precast Products Sacramento 916-386-6174 or Stockton 209-464-7697 distribution centers is posted on their website at : http://www.oldcastleprecast.com http://www.teichert.com/att.cfm**

3. **The distributor for PVC conduit, fittings and accessories is SAF-T-CO. Their main number is 714-547-9975. They can also be Contacted through their website at www.saftco.com**

Conduit Suppliers

Southern California	Northern California
Saf-t-co	Herning Supply
Cal-duct	CED
Beacon Electric	Central Wholesale
CED	GE Supply
CES	Independent Utility
Crescent	Independent Electric
TVC, inc.	Wedco
	Maltby
	Northern Valley Distributing
	Graybar

Installation Specifications for Boxes

1. All boxes must be placed in areas outside of vehicular traffic. The AT&T engineer will specify the size and location of boxes. Manholes will be specified in areas that are exposed to vehicular traffic.

2. Placement of boxes and manholes must allow for the final grade of new sidewalk and parkways.

3. A minimum of six inches (6") of compacted sand, graded level is required under all pull boxes (hand holes) and splice boxes. Six inches (6") of gravel, drain rock or base rock is required for manholes. The floor must be level and free of debris.

4. Conduit must terminate at the end wall or side wall in a terminator or knockout as specified by the AT&T Engineer. Entry through the bottom of a box or the middle of a side wall is not acceptable.

5. All conduits entering knockouts in a plastic or polymer box must be cut within one inch (1") flush with the inside of the wall and sealed. All joints must be mortared and all unused ports and openings sealed. Use cement mortar, water plug cement or other approved prepared mortars.

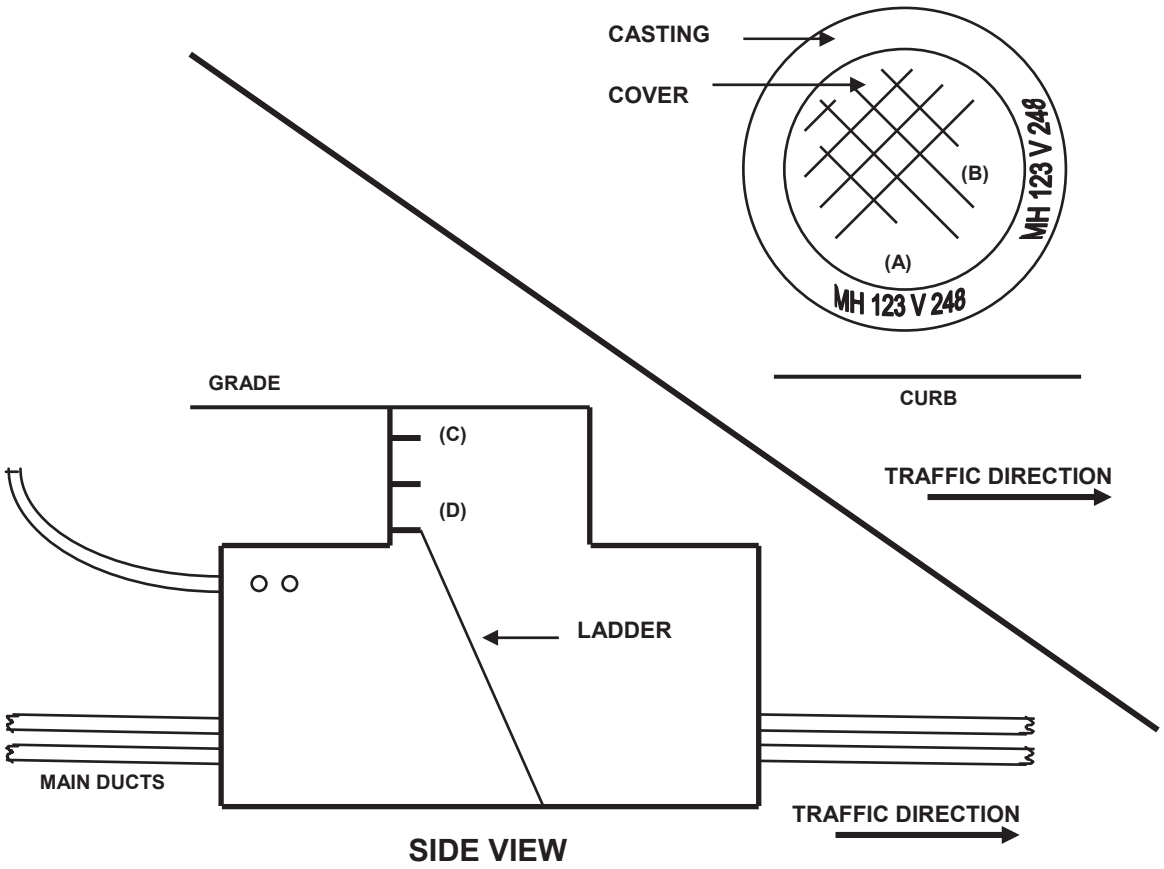
6. Service conduits must be terminated above the main distribution conduits.

7. **AT&T's engineer will specify where Ground Beds are to be placed. (see pages 13-16 for specifications)**

Installation Specifications for Manholes

1. **Conduits must be terminated in the manufactured terminators only. Main conduits must be placed in lower terminators first. From each terminator, a minimum of 5' of straight conduit is required (no bends). Manholes are not to be cored without prior AT&T approval.**
2. **Steps and ladder must face oncoming traffic. Steps: First step 6"- 17" from grade to step (C). All other steps 12" separation from each other (D). All steps must be concreted in place and extended 6" from MH wall.**
3. **Cover from grade to MH roof must be a minimum of 24" and a maximum of 60", unless otherwise indicated by the AT&T engineer.**
4. **Neck of MH (extension) must be painted with white latex paint after joints are mortared.**
5. **Floor of MH must be level.**

MANHOLE DIAGRAM



SIDE VIEW

Service Cabinets, Bonding and Grounding

All service cabinet, bonding, and grounding requirements must meet the National Electrical Code. The list of requirements below provides the minimum specifications accepted by AT&T.

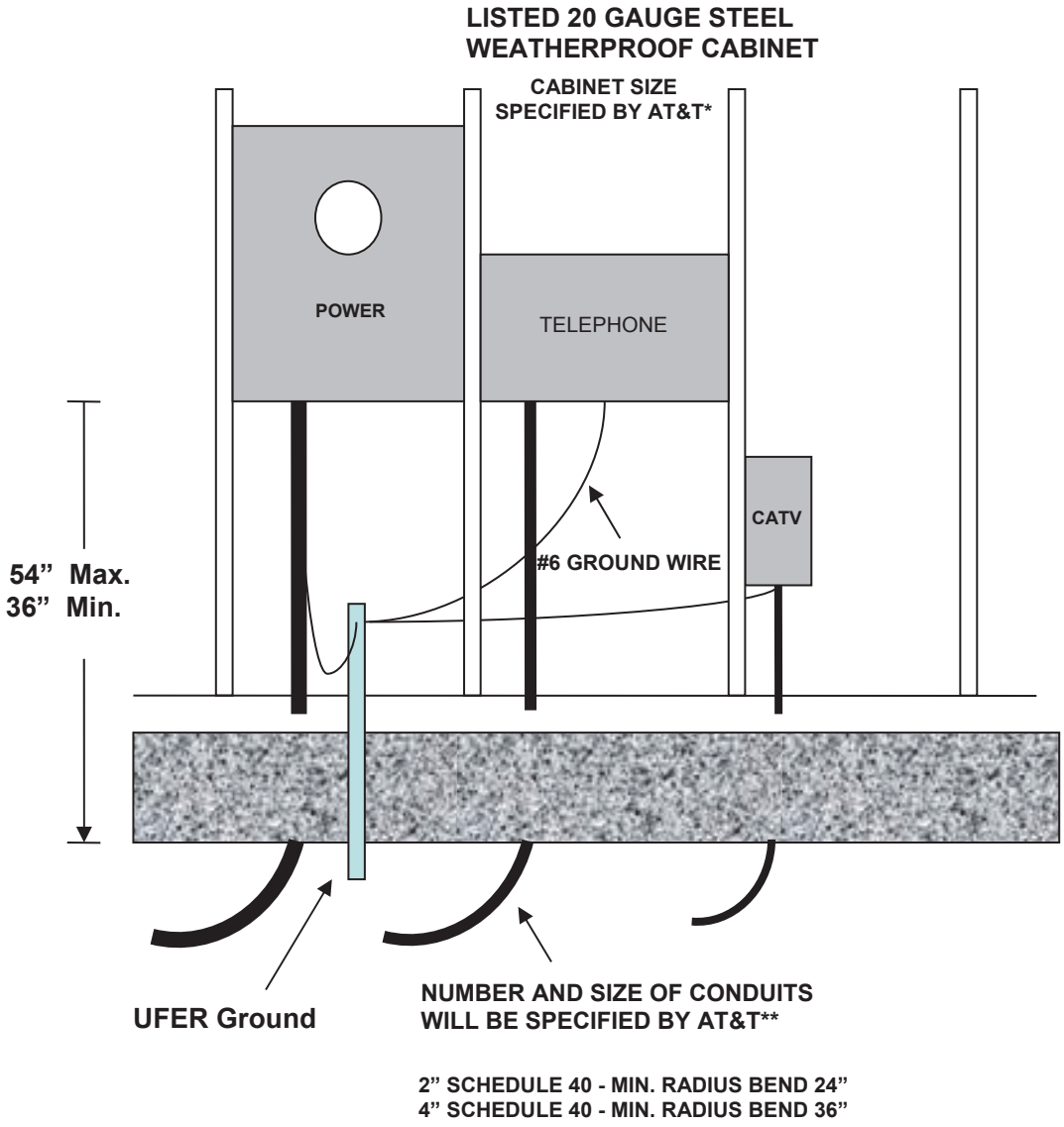
- **20 Gauge Steel Weatherproof Listed Cabinet. The cabinet must be listed by a Nationally Recognized Testing Laboratory, such as UL, and must meet the following UL 50 Standard for Safety Criteria:**
  - **Number 3 R for Exterior Use**
  - **Protection Against Corrosion**
  - **Overlap Requirements**
- **Cabinet size specified by AT&T Engineer**
- **Equipped With ¾" Plywood Backboard**
- **Allow 3' Minimum Clearance In Front Of Cabinet**

Grounding Options For AT&T Facilities Are Listed In Order of AT&T Preference:

1. **#6 copper ground wire to Electrical Power Service Grounding Electrode, Service Grounding Electrode Conductor or Service Panel**
2. **#6 copper ground wire to a Concrete-Encased Electrode meeting the requirements of the NEC (UFER Ground)**
3. **#6 copper ground wire to a Ground Ring meeting the requirements of the NEC or to the metal frame of the building which is effectively grounded.**

NOTE: If the building does not have any electrical power service, connect a #6 copper ground wire to a driven ground rod that is a minimum ½ inch diameter and 8 ft. long. The rod must be installed at least 1' to 2' from the outside wall. This is a TEMPORARY arrangement. When power becomes available, a #6 AWG bond must be installed between the electrical power grounding means and the ground rod.

SERVICE CABINET DIAGRAM



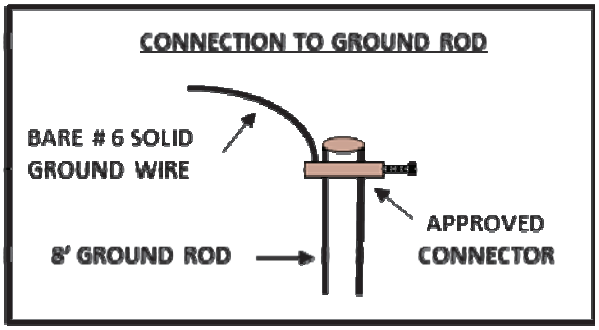
***CABINET SIZE H= W= D=**

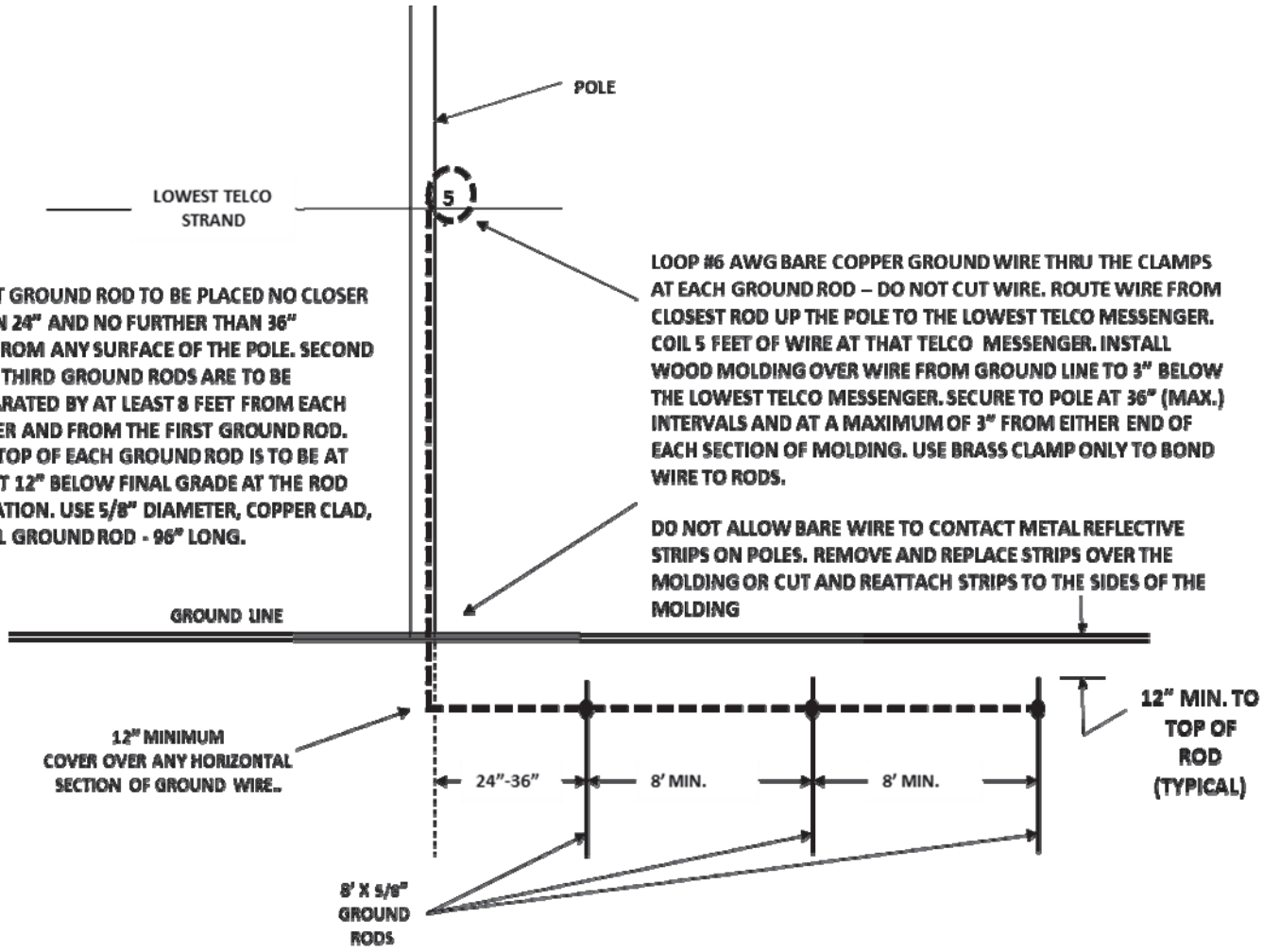
****CONDUIT SIZE = Number =**

NOTE: Grounding source options are Electrical Power Service Grounding Electrode, Service Grounding Electrode Conductor or Service Panel, UFER, or ground ring. See Details on page 10.

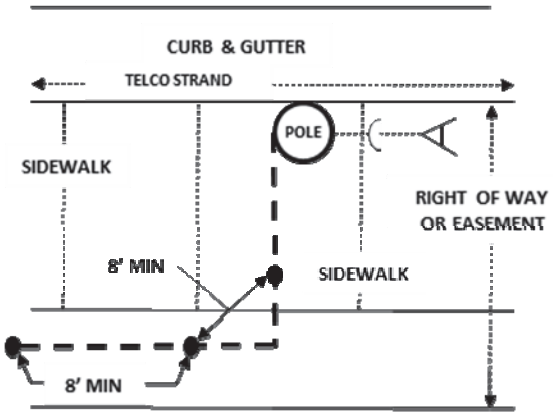
GROUND BEDS AT POLE

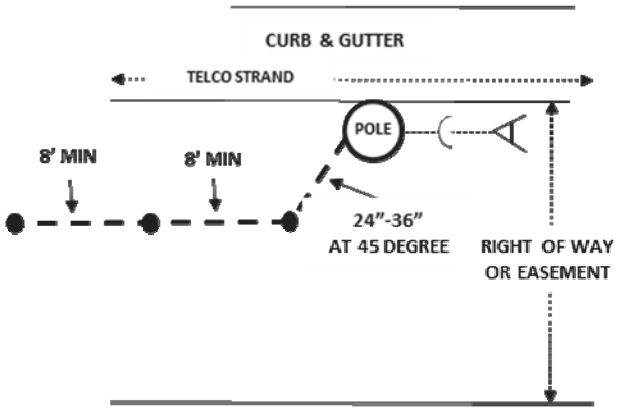
TWO DAYS BEFORE YOU DIG
CALL U.S.A. TOLL FREE
811





POSTITIONING GROUND BEDS AT POLE





GROUND BEDS IN IMPROVED AREAS

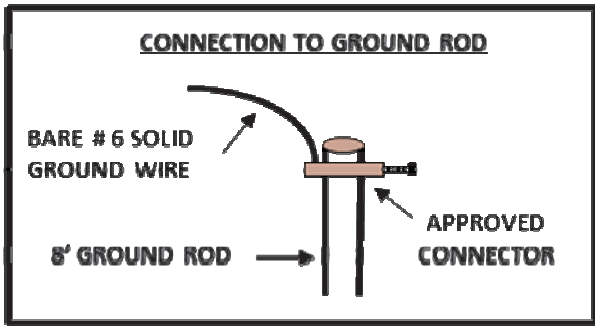
TO REDUCE THE COST IMPACT WHEN PLACING NEW GROUND BEDS IN IMPROVED AREAS, POSITION THE FIRST GROUND ROD 24' - 36" FROM THE POLE THEN, WHERE STREET RIGHTS-OF-WAY OR EASEMENTS ALLOW, ROUTE THE GROUND WIRE BEHIND THE SIDEWALK, PARALLEL TO THE POLE LINE. MAINTAIN ALL SPACING REQUIREMENTS FOR THE SECOND AND THIRD GROUND RODS.
THIS MAY ALSO HAVE THE BENEFIT OF PREVENTING DAMAGE TO THE GROUND BED DURING POLE REPLACEMENTS.
THIS APPLIES TO BOTH DEAD-END AND IN-LINE POLES IN IMPROVED AREAS.

GROUND BEDS IN UNIMPROVED AREAS

TO HELP PREVENT DAMAGE TO A GROUND BED DURING FUTURE POLE REPLACEMENTS IN UNIMPROVED AREAS, POSITION THE FIRST GROUND ROD 24"-36" FROM THE POLE AT A 45-DEGREE ANGLE TO THE POLE LINE THEN, ROUTE THE GROUND WIRE PARALLEL TO THE POLE LINE. MAINTAIN ALL SPACING REQUIREMENTS BETWEEN ALL GROUND RODS. THIS APPLIES TO BOTH DEAD-END AND IN-LINE POLES IN UNIMPROVED AREAS.

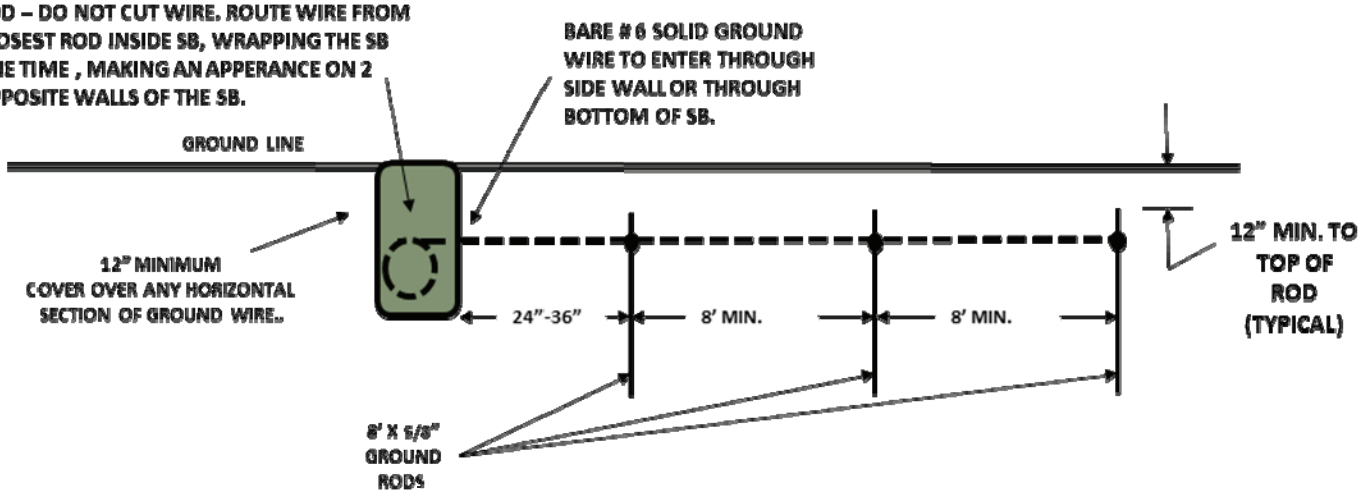
GROUND BEDS AT SPLICE BOX

TWO DAYS BEFORE YOU DIG
CALL U.S.A. TOLL FREE
811

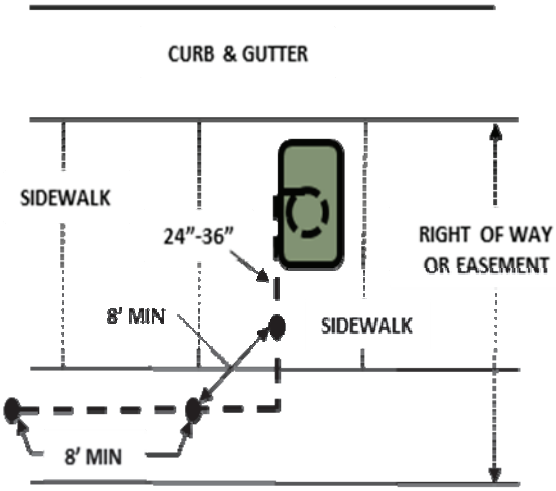


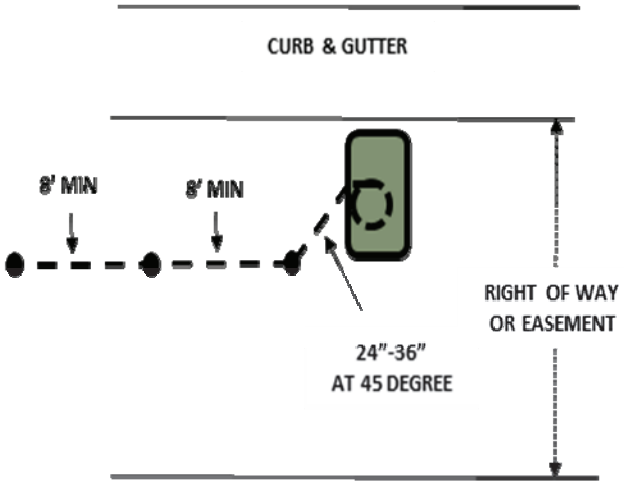
FIRST GROUND ROD TO BE PLACED NO CLOSER THAN 24" AND NO FURTHER THAN 36" TO/FROM ANY SURFACE OF THE POLE. SECOND AND THIRD GROUND RODS ARE TO BE SEPARATED BY AT LEAST 8 FEET FROM EACH OTHER AND FROM THE FIRST GROUND ROD.
THE TOP OF EACH GROUND ROD IS TO BE AT LEAST 12" BELOW FINAL GRADE AT THE ROD LOCATION. USE 5/8" DIAMETER, COPPER CLAD, STEEL GROUND ROD - 96" LONG.

LOOP #6 AWG BARE SOLID COPPER GROUND WIRE THRU THE CLAMPS AT EACH GROUND ROD – DO NOT CUT WIRE. ROUTE WIRE FROM CLOSEST ROD INSIDE SB, WRAPPING THE SB ONE TIME , MAKING AN APPERANCE ON 2 OPPOSITE WALLS OF THE SB.



POSTITIONING GROUND BEDS AT SPLICE BOXES





GROUND BEDS IN IMPROVED AREAS

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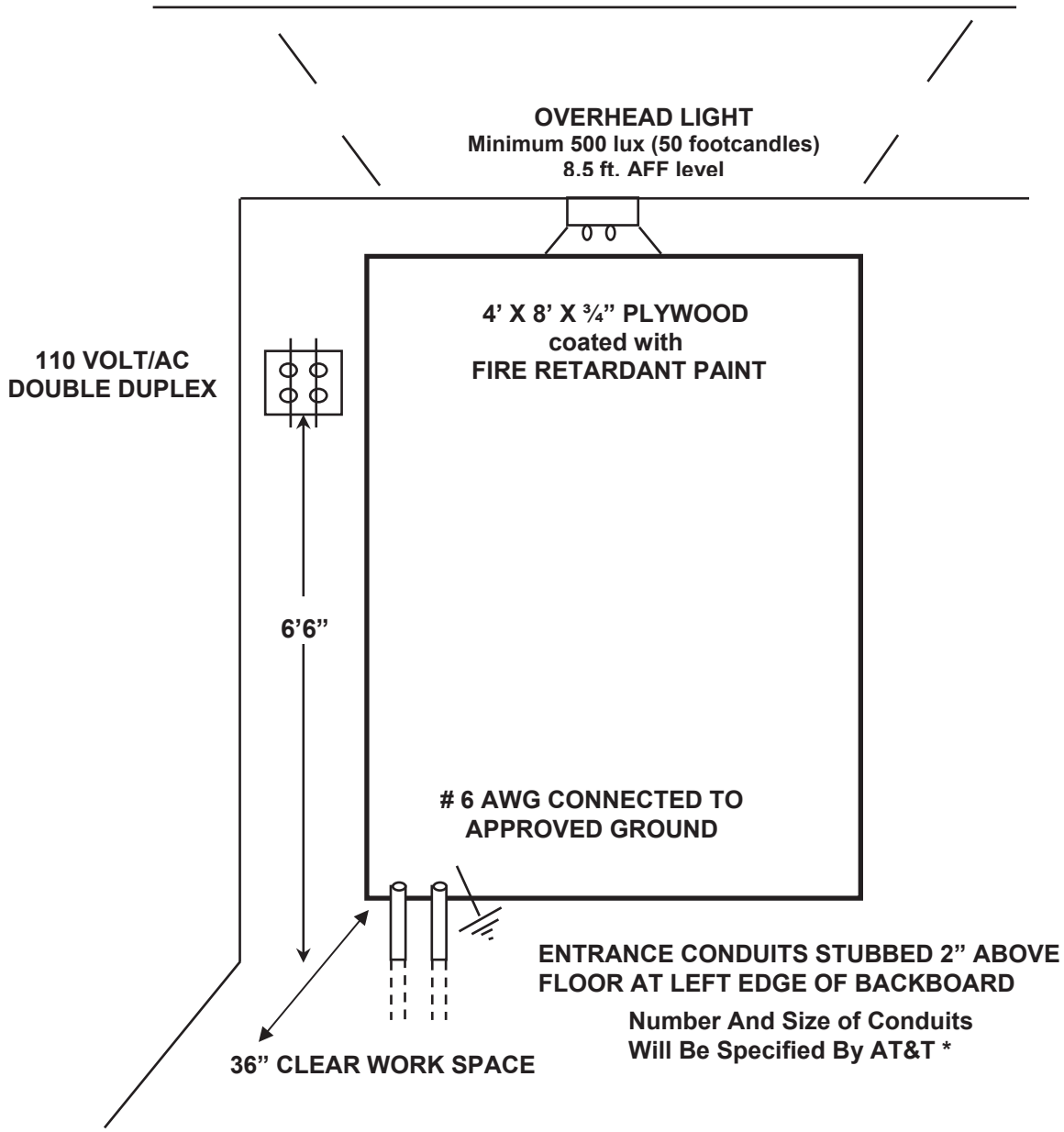
THIS MAY ALSO HAVE THE BENEFIT OF PREVENTING DAMAGE TO THE GROUND BED DURING CABLE REPLACEMENTS.

GROUND BEDS IN UNIMPROVED AREAS

TO HELP PREVENT DAMAGE TO A GROUND BED DURING FUTURE CABLE REPLACEMENTS IN UNIMPROVED AREAS, POSITION THE FIRST GROUND ROD 24"-36" FROM THE SB AT A 45-DEGREE ANGLE TO THE TRENCH LINE THEN, ROUTE THE GROUND WIRE PARALLEL TO THE TRENCH LINE. MAINTAIN ALL SPACING REQUIREMENTS BETWEEN ALL GROUND RODS.

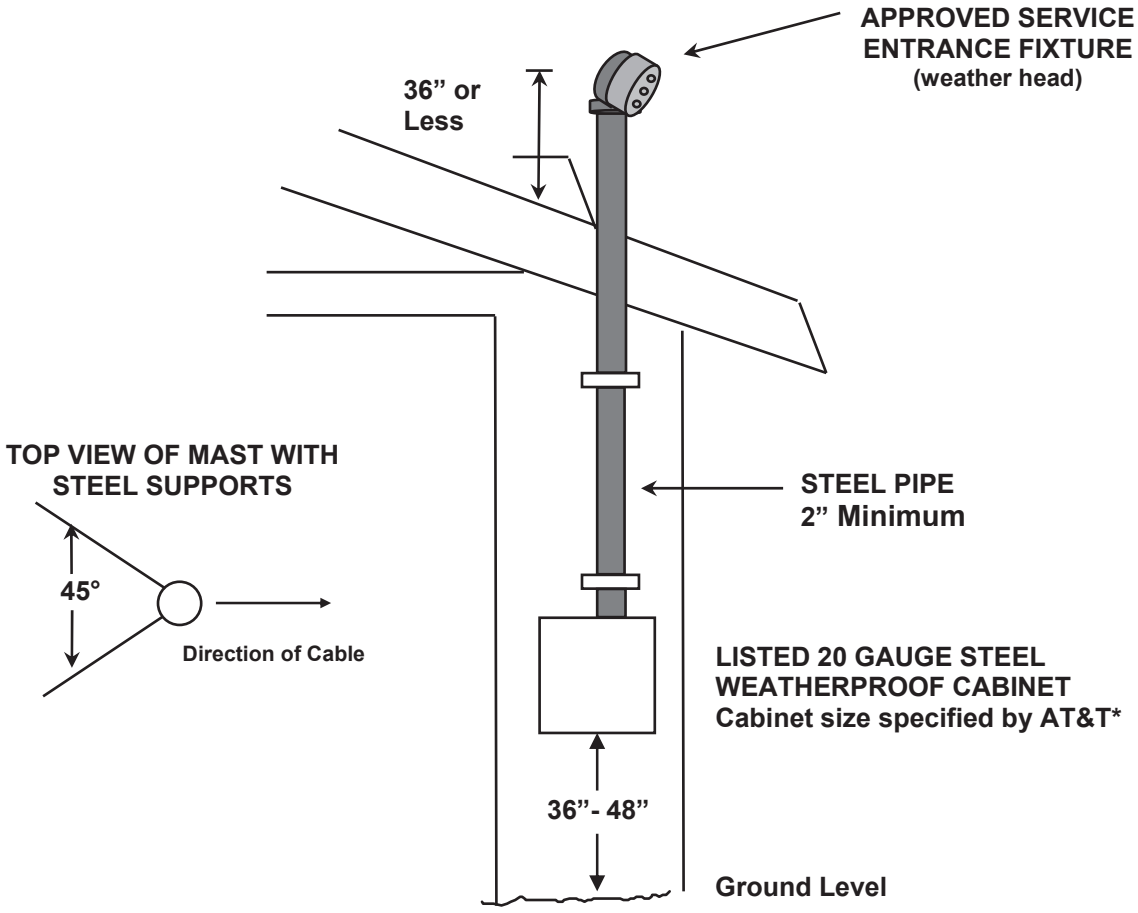
BACKBOARD DIAGRAM



***CONDUIT SIZE = NUMBER =**

NOTE: Grounding source options are Electrical Power Service Grounding Electrode, Service Grounding Electrode Conductor or Service Panel, UFER, or ground ring. See page 10 for Details.

AERIAL INSTALLATION DIAGRAM (To Exterior Wall)



***CABINET SIZE H= W= D=**

NOTES

1. **Slack span from pole to mast not to exceed 100'**
2. **Masts over 36" require 1" steel supports secured to roof with lag screw**
3. **Attach mast to studding with pipe straps**
4. **Steel conduit must be grounded**
5. **Minimum distance from Power is 12" per Cal P.U.C. GO 95**
6. **Minimum 36" clearance in front of telephone cabinet**
7. **Cabinet must be equipped with plywood backboard**

AERIAL INSTALLATION DIAGRAM (To Interior Wall)

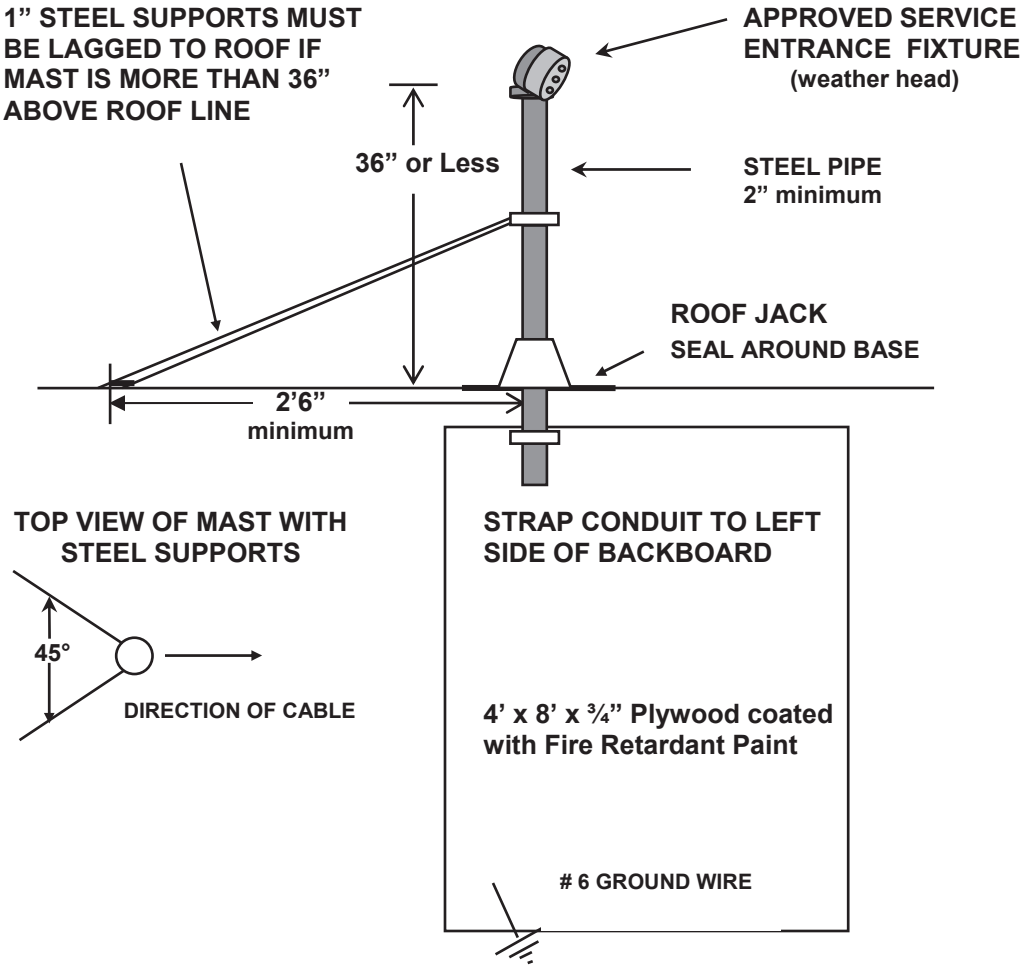


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TABLE OF CONTENTS

061800 GLUED-LAMINATED CONSTRUCTION
064023 INTERIOR ARCHITECTURAL WOODWORK

DIVISION 7 – THERMAL AND MOISTURE PROTECTION
071900 WATER REPELLENTS
072100 THERMAL INSULATION
075419 POLYVINYL-CHLORIDE (PVC) ROOFING
076100 SHEET METAL ROOF
076200 SHEET METAL FLASHING AND TRIM
077200 ROOF ACCESSORIES
079200 JOINT SEALANTS

DIVISION 8 – OPENINGS
081113 HOLLOW METAL DOORS AND FRAMES
081416 FLUSH WOOD DOORS
083113 ACCESS DOORS AND FRAMES
083613 SECTIONAL DOORS
084113 ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS
085113 ALUMINUM WINDOWS
086200 UNIT SKYLIGHTS
086250 TUBULAR DAYLIGHTING DEVICE
087100 DOOR HARDWARE
088000 GLAZING

DIVISION 9 – FINISHES
092900 GYPSUM BOARD
095123 ACOUSTICAL TILE CEILING
096513 RESILIENT BASE AND ACCESSORIES
096519 RESILIENT TILE FLOORING
099113 EXTERIOR PAINTING
099123 INTERIOR PAINTING
099300 STAINING AND TRANSPARENT FINISHING

DIVISION 10 – SPECIALTIES
101100 VISUAL DISPLAY UNITS
102239 FOLDING PANEL PARTITIONS
102800 TOILET, BATH, AND LAUNDRY ACCESSORIES
104413 FIRE PROTECTION CABINETS
104416 FIRE EXTINGUISHERS
105113 METAL LOCKERS

DIVISION 11 – EQUIPMENT
113100 RESIDENTIAL APPLIANCES
115213 PROJECTION SCREENS

DIVISION 12 – FURNISHINGS

129300	SITE FURNISHINGS

DIVISION 13 – SPECIAL CONSTRUCTION

NOT USED

DIVISION 14 – CONVEYING EQUIPMENT

NOT USED

DIVISION 21 – FIRE SUPRESSION

NOT USED

DIVISION 22 – PLUMBING

220523.12	BALL VALVES FOR PLUMBING PIPING
220548.13	VIBRATION AND SEISMIC CONTROLS FOR PLUMBING FOR PLUMBING PIPING AND EQUIPMENT
220553	IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT
220719	PLUMBING PIPING INSULATION
221113	FACILITY WATER DISTRIBUTION PIPING
221116	DOMESTIC WATER PIPING
221313	FACILITY SANITARY SEWER
221316	SANITARY WASTE AND VENT PIPING
221423	STORM DRAINAGE PIPING SPECIALTIES
223300	ELECTRIC, DOMESTIC-WATER HEATERS
224213.13	COMMERCIAL WATER CLOSETS
224216.13	COMMERCIAL LAVATORIES
224216.16	COMMERCIAL SINKS
224713	DRINKING FOUNTIANS

DIVISION 23 – HEATING VENTILATING AND AIR CONDITIONING

230553	IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT
230593	TESTING, ADJUSTING, AND BALANCING FOR HVAC
230713	DUCT INSULATION
232300	REFRIGERANT PIPING
233113	METAL DUCTS
233300	AIR DUCT ACCESSORIES
233713.13	AIR DIFFUSERS
233713.23	REGISTERS AND GRILLES
233723	HVAC GRAVITY VENTILATORS
238126	SPLIT-SYSTEM AIR-CONDITIONERS

DIVISION 26 – ELECTRICAL

260500	BASIC ELECTRICAL REQUIREMENTS
260513	MEDIUM VOLTAGE CABLE
260519	WIRE AND CABLE
260526	GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
260529	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
260533	RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS
260534	BOXES
260536	CABLE TRAYS
260544	PRECAST MANHOLES AND HANDHOLES
260553	IDENTIFICATION FOR ELECTRICAL SYSTEMS
260572	OVERCURRENT PROTECTIVE DEVICE SHORT CIRCUIT STUDY
260573	OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY
260574	OVERCURRENT PROTECTIVE DEVICE ARC-FLASH STUDY
260575	ACCEPTANCE TESTING
260923	OCCUPANCY SENSORS
260943	DLM LIGHTING CONTROLS
260950	LIGHTING CONTROLS
262323	SINGLE-PHASE CENTRAL BATTERY INVERTERS
262324	THREE-PHASE CENTRAL BATTERY INVERTERS
262413	SWITCHBOARDS
262416	PANEL BOARDS
262726	WIRING DEVICES AND CONNECTORS
262816	CIRCUIT AND MOTOR DISCONNECTS
265100	INTERIOR LIGHTING
265600	EXTERIOR LIGHTING

DIVISION 27 – COMMUNICATIONS

NOT USED

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

283111	DESIGN-BUILD FIRE ALARM

DIVISION 31 – EARTHWORK

311000	SITE CLEARING
312000	EARTH MOVING

DIVISION 32 – EXTERIOR IMPROVEMENTS

321216	ASPHALT PAVING
321218	DECOMPOSED GRANITE PAVING
321313	CONCRETE PAVING
321723	PAVEMENT MARKINGS
328400	PLANTING IRRIGATION
329210	HYDROMULCH SEEDING
329300	PLANTS

DIVISION 33 – UTILITIES

334713 POND AND RESERVOIR LINERS

APPENDIX

A. GEOTECHNICAL REPORT AND RECOMMENDATIONS
B. PAINT COLOR LOCATION DIAGRAMS
C. FURNITURE AND EQUIPMENT LIST

END OF TABLE OF CONTENTS

SECTION 075419 - POLYVINYL-CHLORIDE (PVC) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Related Documents:

1. Drawings and general provisions of the Subcontract apply to this Section.
2. Review these documents for coordination with additional requirements and information that apply to work under this Section.

B. Section Includes:

1. Mechanically fastened polyvinyl chloride (PVC) thermoplastic membrane roofing.
2. Preparation of roof surfaces for application of roofing system.
3. Roof insulation.
4. Traffic pads.
5. Membrane flashing.
6. Roof breather vents.
7. Coordination of items built into roofing system.

C. Related Sections:

1. Division 01 Section "General Requirements."
2. Division 01 Section "Special Procedures."
3. Division 02 Section "Selective Structure Demolition".
4. Division 07 Section "Sheet Metal Flashing and Trim".
5. Division 09 Section "Joint Sealants".
6. Division 23 "HVAC".
7. Division 26 "Electrical."

1.2 REFERENCES

A. General:

1. The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply.
2. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work.
3. Refer to Division 01 Section "General Requirements" for the list of applicable regulatory requirements.

B. ASTM International:

1. ASTM C1289 – Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
2. ASTM D-751 - Standard Test Methods for Coated Fabrics

3. ASTM D-882 – Standard Test Method for Tensile Properties of Thin Plastic Sheeting
4. ASTM D-1240 – Standard Test Methods for Rosin Acids Content of Naval Stores, Including Rosin, Tall Oil, and Related Products
5. ASTM D-3045 – Standard Practice for Heat Aging of Plastics Without Load
6. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
7. ASTM D-4434 – Standard Specification for Poly (Vinyl Chloride) Sheet Roofing

C. Bay Area Air Quality Management District (BAAQMD): Regulation 8-51 - Adhesive and Sealant Products.

D. California Building Code (CBC), 2001 Edition: Chapter 15 and Appendix Chapter 15.

E. California Fire Code (CFC), 2001 Edition: Chapter 11.

F. Factory Mutual Engineering and Research Corp. (FM):

1. FM P7825 - Approval Guide - Equipment, Materials, Services for Conservation of Property.
2. FM AS4470 - Approval Standard 4470 Class I Roof Covers.
3. FM D/51-28 - Insulated Steel Decks.
4. FM Class I-60.
5. FM Bulletin I-49 - Perimeter Flashings.

G. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.

H. Underwriters' Laboratories, Inc. (UL):

1. UL 790 - Tests for Fire Resistance of Roof Materials.
2. UL 1256 - Fire Test for Roof Deck Constructions.
3. UL BMD - Building Materials Directory.

1.3 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 for definition of terms related to roofing work not otherwise defined in this Section.

1.4 SYSTEM DESCRIPTION

A. Provide a PVC thermoplastic membrane roofing and base flashing system that is watertight; will not permit the passage of liquid water; will withstand wind loads, thermally induced movement, and exposure to weather without failure.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing system manufacturer based on testing and field experience.

C. Roofing System Design: Provide a PVC thermoplastic membrane roofing system that complies with roofing system manufacturer’s written design instructions and with the following:

1. ASTM E 108 Class A for application and slopes indicated.
2. FM: Fire/Wind Uplift - Class 1A-60.
3. CBC: Section 1504 -Roofing Classification: UBC Standard 15-2 Class A.
4. ES Legacy Report (NER 227).
5. Weight: Weight of roofing system including roof membrane, insulation and auxiliary components shall not exceed 2.25 psf.

D. Energy Performance: Provide roofing system with initial Solar Reflectance Index not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.

E. Energy Performance: Provide roofing system with initial solar reflectance not less than 0.70 and emissivity not less than 0.75 when tested according to CRRC-1.

1.5 SUBMITTALS

A. Submit under provisions of Division 01 Section "General Requirements."

B. Product Data: For each type of roofing product specified, submit the following:

1. Written list of all materials for use in this project.
2. Manufacturer's literature, specifications, recommendations and installation instructions for roof membrane, base flashing, insulation, fasteners, and other materials required to provide a complete system.
   a. Include volatile organic compounds (VOCs) in grams/liter (g/l).
3. Identify in writing the differences between manufacturer's instructions and the requirements in this Section. Provide manufacturer's written approval of project modifications.
4. Manufacturer's literature, letter of certification, or certified laboratory test report stating that each material complies with the requirements of this Section and is intended for the application shown.
5. Manufacturer's written certificate of compliance for all products delivered to the job site that its products conform to applicable material standards, and the products are physically and chemically compatible with each other.
6. Material Safety Data Sheets (MSDS).
7. UL and FM approvals.

C. Shop Drawings: Plans, sections, and details of the following:

1. Base flashings and roof membrane terminations.
2. Layout of insulation board indicating thickness to achieve drainage slopes, crickets and fastening system and pattern.
3. Roof breather vent locations.

D. Samples:

1. Roof membrane, including T-shaped side and end laps 12 by 12 inches (300 by 300 mm).
2. Roof insulation 12 by 12 inches (300 by 300 mm).
3. Walkway pad - 12 by 12 inches (300 by 300 mm) if roll, 1 unit if tile.
4. Termination and fascia bars – 12 inches (300 mm) length.
5. Roof membrane fastener/distribution plates of each type, length, and finish.

6. Insulation fasteners of each type, length, and finish.

E. Installer Certificate: Signed by roofing system manufacturer certifying that installer is approved, authorized, or licensed by manufacturer to install specified roofing system.

F. Warranty: Sample copy of roofing system manufacturer's standard warranty stating obligations, remedies, limitations, and exclusions of warranty.

G. Closeout Submittals:

1. Information Card: For each roofing installation, 2 - 8 1/2 by 11 inches cards, typewritten, laminated and framed, or photo engraved on 0.032 inches (8 mm) aluminum containing the information listed in Article 3.11.
2. Product Usage Records: 3 copies of product usage records for each adhesive, sealant and solvent product used in the project. Include product name, amount used, and period of time over which the product was used.
3. Installer's Certification: Certification that work under this Section has been installed in accordance with these specifications.
4. Manufacturer's maintenance Instructions.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Installer specializing in installing roofing systems similar to specified system, and who is approved, authorized, or licensed by the roofing system manufacturer to install manufacturer's product.

B. Identify materials with appropriate markings of applicable testing and inspecting agency (UL, FM).

C. Pre-Installation Meeting:

1. Before beginning roofing, insulation and associated work, and submittals have been reviewed and approved, the Project Manager shall hold a Pre-Installation Meeting. The meeting shall be attended by the Project Manager, the University's Inspector, the LBNL Construction Superintendent, the Subcontractor, the roofing manufacturer's technical representative, the installer, and personnel directly responsible for the installation of roofing and insulation, flashing and sheet metal work.
2. Conflicts among those attending the meeting shall be resolved and confirmed in writing before roofing work is begun.
3. Agenda:

    a. Review methods and procedures related to roofing work.
    b. Tour representative areas of roof decks, and inspect and discuss conditions of substrates, roof drains, curbs, penetrations and other preparatory work performed by other trades.
        1) Inspect deck substrates for appropriate slopes.
    c. Review structural loading limitations of roof deck.
    d. Review roofing system requirements of Subcontract Documents.
    e. Review approved submittals.
    f. Review and finalize roofing construction schedule.

1) Verify availability of materials, equipment, and facilities needed to make progress and avoid delays.

g. Review required inspection, testing, certifying and materials usage accounting procedures.

h. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions, including possibility of temporary roofing.

i. Review Subcontractor's plan for coordination of work of various trades involved in providing roofing system and other components secured to roofing.

j. Safety requirements:

1) Installation, material handling, and associated equipment shall conform to and be operated in conformance with OSHA safety requirements.

2) Provide a sufficient number of filled and operating fire extinguishers meeting current code standards on the roof deck at all times during roofing operations.

3) Coordinate the work of other trades involved in the project for safe operations.

k. Planning and performing the work to ensure no dirt or dust enters the building.

l. Determine areas on the job site to be used as work and storage areas.

m. Enact provisions for monitoring the roof after completion.

n. Other details of the work the Subcontractor is to perform which are not shown on Drawings.

1.7 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 and type, date of manufacture, and directions for storing and mixing with other components.

1. Identify materials with FM and UL markings.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by the roofing system manufacturer.

1. Protect stored liquid materials from direct sunlight.
2. Discard and dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from 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 roof deck.

1.8 PROJECT CONDITIONS

A. Environmental Requirements: Proceed with roofing work only when existing and forecast weather conditions permit roofing to be installed according to manufacturer's written instructions and warranty requirements.

1.9 WARRANTY

A. Standard Roofing Manufacturer's Warranty: Submit a written warranty, without monetary limitation, signed by roofing system manufacturer, agreeing to promptly repair leaks resulting from defects in materials or workmanship for a period of not less than 15 years. Warranty shall include the following:

1. Manufacturer shall pay all costs to replace or restore to its original condition all flat stock and tapered roof insulation that becomes moisture saturated due to leaks resulting from faulty materials or workmanship.
2. Manufacturer shall pay all costs associated with replacement of rusted or otherwise defective "approved" fasteners.
3. The warranty shall cover 100 percent replacement cost.
4. There shall be no penal sum associated with this warranty.
5. The University shall be able to make temporary repairs without voiding the warranty.
6. Copies of the roof plan, details and specifications shall be attached to the warranty.
7. There shall be no exclusions in the warranty for consequential damages.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Primary materials shall be the products of one manufacturer. Secondary materials shall be as required or recommended by primary materials manufacturer, and in accordance with these specifications.

B. Approved PVC Thermoplastic Membrane Roofing Manufacturers: Duro-Last, Bondcote, Fibertite, or equal.

C. Established Standard: Products of Duro-Last Roofing, Inc. or equal products from approved manufacturers listed in Article 2.01B above.

1. Manufacturer's standard details applicable to this project are attached at the end of this section.

2.2 MATERIALS

A. Roof Membrane Sheet: Uniform flexible sheet formed from polyvinyl chloride with plasticizers and modifiers, complying with ASTM D4434, Type IV, of the following type, grade, thickness, and exposed face color.

1. Thickness: 40 mils, nominal, 16 mils above reinforcement.
2. Exposed Face Color: Berkeley Gray, embossed texture
3. Minimum Physical Properties:

a. Breaking Strength: 275 lbs/in, ASTM D751, Procedure A.
b. Elongation at Break: 25 percent, ASTM D751.
c. Tearing Strength: 90 lbs/ft.

d. Resistance to Heat Aging: 90 percent retention of breaking strength and elongation at break, ASTM D3045.
e. Low-Temperature Bend: Pass at minus 40 degrees F, ASTM D2136.
f. Accelerated Weathering Test: No cracking or crazing after 6000 hours, ASTM D4434.
g. Linear Dimensional Change: 0.5 percent maximum after 6 hours at 176 degrees F, ASTM D1204.
h. Water Absorption: Less than 3 percent mass change, ASTM D570.

B. Insulation:

1. Polyisocyanurate Board: As recommended by roofing membrane manufacturer from products manufactured by Energy Solutions Insulation, Inc., ESI tapered insulation board; Firestone Inc., ISO 95+ tapered insulation board, or equal. Established standard ES – Foam I tapered board as manufactured by Energy Solutions Insulation, Inc., (877)285-7692, 831 Morley Drive, Saginaw, Michigan 48601.
2. Preformed Tapered Roof Insulation: Boards complying with requirements, selected from manufacturer's standard sizes and thickness to achieve slopes indicated, minimum 1/2" thickness.
3. Insulation Accessories: Accessories as recommended by insulation manufacturer for intended use, and approved by roofing membrane manufacturer.

C. Auxiliary Materials:

1. General: Furnish auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing material.
2. Furnish liquid-type auxiliary materials that meet VOC limits of authorities having jurisdiction.
3. Sheet Flashing: Manufacturer's standard sheet flashing of the same material, type, thickness, and color as roof membrane.
4. Slip-Sheet: Manufacturer's recommended slip-sheet of type required for application.
5. Termination Bars: Manufacturer's standard bars, approximately 1 to 1.5 inches wide, formed, and prepunched.
6. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provision of FM4470, designed for fastening sheet to substrate, and acceptable to roofing system manufacturer and insulation manufacturer.
7. Miscellaneous Accessories: Provide pourable sealers, preformed pipe sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, seam caulk, termination reglets, breather vents, and other accessories recommended by roofing manufacturer for intended use. These accessories are to be covered by the roofing systems manufacturer's system warranty for the warranty period.
8. Pre-fabricated Piping Support Bases: Advanced Support Products, Inc, Key Curb Supports #KC6, KC9 or KC13; The Pate Company, #ES2; or approved equal; sizes and configurations indicated.
9. Underlayment Board: Manufacturer's recommended underlayment board required for the application.
10. Walkway Pads: Factory-formed, nonporous, heavy-duty, slip-resistant, surface-textured walkway pads, 1/8-inch thick, minimum, of materials acceptable to roofing system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATON

A. Inspect the roof deck and verify that there are no conditions which may prevent or interfere with the installation of the roof and flashing system.

B. Report any adverse condition which may affect the performance of the roof system in writing to the Project Manager. Absence of such notification shall constitute Subcontractor's verification that existing conditions will allow the installation of the system in accordance with the Drawings, Specifications and manufacturer's warranty.

C. Ensure that the following conditions exist prior to application of roofing materials:

1. Drains, curbs, cants, area separators, perimeter walls, roof penetrating components, and equipment supports are in place.
2. Surfaces are rigid, dry, smooth, and free from cracks, holes, depressions, waves, sharp changes in elevation, and projections.
3. Concrete decks have been cured to roof membrane manufacturer's recommended moisture content, inspected and approved by the manufacturer's representative.
4. The substrate plane does not vary more than 1/8-inch (3 mm) within an area 10 by 10 (3 by 3 m) feet when checked with a 10-foot (3 m) straight edge placed anywhere on the substrate
5. Substrate is prepared to elevations indicated on the Drawings, and relationship of substrate to cast-in-place roof drains provides positive drainage as required.
6. Walls and vertical surfaces are constructed to receive base flashings and counter flashings.
7. Treated wood nailers are fastened in place at eaves, gable ends, openings, and intersections with vertical surfaces for securing of roof membranes and related components and roof fixtures. Nailers are the same thickness as the roof insulation, unless otherwise shown.

3.2 PREPARATION

A. Clean substrate of dust, debris, and other substances detrimental to roofing installation, in accordance with roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and over-flow drains, and migrating onto surfaces of other construction. Remove roof-drain plugs when no roof work is taking place or when rain is forecast.

C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of each workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

D. Surface Preparation:

1. Prior to commencing roof installation, all roof substrates shall be clean and free of all debris.
2. Correct defects and inaccuracies in roof deck surface to eliminate poor drainage and hollow and low spots.

E. Do not apply roofing materials unless proper temperature can be maintained.

F. Coordinate the work with other trades to assure that components which are to be secured to or built into the roofing system are available and that flashing and counter flashing are installed as the work progresses.

3.3 INSULATION INSTALLATION

A. Coordinate installing roofing system components, so insulation is not exposed to precipitation or left exposed at the end of the day.

B. Comply with roofing system manufacturer's written instructions for installing roof insulation.

C. Mechanically fasten insulation boards in accordance with roofing system's and insulation manufacturer's instructions and approve Shop drawing fastening layout.

D. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

E. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding ¼-inch with same insulation.

F. Cut and fit insulation within ¼-inch of nailers, projections, and penetrations.

G. Conform layout, crickets and drainage slopes to approved shop drawings.

3.4 MECHANICALLY FASTENED SHEET INSTALLATION

A. Install roof membrane over area to receive roofing according to roofing system manufacturer's written instructions, and standard installation details. Unroll sheet and allow to relax for a minimum 30 minutes.

1. Install sheet according to ASTM D5082.

B. Start installation in the presence of roofing system manufacturer's technical representative.

C. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Mechanically fasten sheet securely at terminations and perimeter of roofing.

E. Apply roofing sheet with side laps shingled with slope of roof deck where possible.

F. Spread sealant bed over deck drain flange at deck drains and securely seal roofing sheet in place with clamping ring. Back putty the inside of adjustable roof drain collar with drain hub with roof cement to watertight condition.

G. In-Seam Attachment: Secure one edge of the sheet using fastening plates centered within the roof membrane seam and mechanically fasten sheet to roof deck. Field-weld seam according to manufacturer's seam installation instructions

H. Install sheet and auxiliary materials in accordance with manufacturer's written instructions.

I. Install breather vents, placed between roof membrane fastening tabs, in accordance with manufacturer's written instructions, and at the rate of 1 vent per 10 squares of roofing, minimum 2) required, at locations shown on approved shop drawings.

3.5 SEAM INSTALLATION

A. Clean seam areas, overlap sheets, and weld side and end laps of sheets and flashings according to manufacturer's written instructions to ensure a watertight seam installation. Weld seam using hot air method.

B. Test lap edges with probe to verify seam weld continuity.

C. Repair tears, voids, and lapped seams in roofing that do not meet requirements.

3.6 FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories and adhere to substrate in accordance with roofing system manufacturer's written instructions and standard installation details.

1. If required, apply bonding adhesive to substrate and underside of flashing sheet at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.
2. At walls and vertical surfaces, if there is presence of materials that are not compatible with flashing, install separation sheet as recommended by roofing roof membrane manufacturer's written instructions.

B. Flash penetrations with pre-fabricated flashing assemblies provided by roof membrane manufacturer and field-formed sheet flashing inside and outside corners as recommended by manufacturer.

C. Clean seam areas and overlap sheets. Weld side and end laps to ensure a watertight seam installation.

D. Test lap edges with probe to verify seam weld continuity. Apply lap sealant and seal exposed edges of sheet flashing terminations.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.7 FIELD QUALITY CONTROL

A. Provide full-time supervisor/foreman on jobsite during roofing work who is experienced in installation of specified roofing system.

B. Provide roof membrane and insulation manufacturer site inspections as required for the Warranty.

C. Verify field strength of seams a minimum of twice daily, according to manufacturer's written instructions, and repair seam sample areas.

D. Final Roof Inspection: Arrange for roofing system manufacturer's technical representative to inspect roofing installation on completion and submit report to Project manager.

1. Notify Project Manager 48 hours in advance of the date and time of inspection.

3.8 PROTECTION AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report with copies to the Project Manager.

B. Correct deficiencies or remove roofing that does not comply with requirements, repair substrates, reinstall roofing, and repair sheet flashings to a condition free of damage and deterioration at the time of Substantial Completion and according to warranty requirements.

C. Clean debris from adjacent construction using procedures required by the manufacturer of affected construction.

3.9 INFORMATION CARD

A. At completion of work of this Section, provide filled-in information card in the format below. Install card near the point of access to the roof.

INFORMATION CARD

SINGLE - PLY MEMBRANE ROOFING SYSTEM COMPONENTS

Building Number: Roof Number:

Subcontract Number:

Deck Type: Deck Slope:

Dry Sheathing Paper: [ ]Yes [ ] No

Underlayment Board:

Insulation Manufacturer: Thickness:
Type: R-Value:

Sheet Materials Manufacturer:

Sheet Flashing

Bonding Adhesive

Termination Bars & Battens:

Fasteners:

Insulation:

Flashing Material: Weight or Gauge:

Statement of Compliance or Exceptions:

Date of Substantial Completion: Guaranty Period:

Roofing Subcontractor: Name, address, and phone number

Signature _____

Prime Subcontractor: Name, address, and phone number

Signature _____

Roofing Manufacturer: Name, address, and phone number

Signature _____

END OF SECTION 075400

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes surface preparation and the application of paint systems on the following exterior substrates:

1. Steel.
2. Galvanized metal.
3. Aluminum (not anodized or otherwise coated).
4. Wood.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each finish and for each color and texture required.

C. Product List: Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.3 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on benchmark samples.

a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

b. Exterior painted metal to match existing painted metal components at the Visitor Center located at 1 Father Junipero Serra Trail, San Diego, CA 92119.

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors: As selected by Architect from manufacturer's full range.

2.2 BLOCK FILLERS

A. Interior/Exterior Latex Block Filler: MPI #4.

1. VOC Content: E Range of E3.

2.3 PRIMERS/SEALERS

A. Alkali-Resistant Primer: MPI #3.

1. VOC Content: E Range of E2.

B. Bonding Primer (Water Based): MPI #17.

1. VOC Content: E Range of E2.

C. Bonding Primer (Solvent Based): MPI #69.

1. VOC Content: E Range of E2.

D. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint system indicated.

2.4 METAL PRIMERS

A. Alkyd Anticorrosive Metal Primer: MPI #79.

1. VOC Content: E Range of E2.

B. Quick-Drying Alkyd Metal Primer: MPI #76.

1. VOC Content: E Range of E2.

C. Cementitious Galvanized-Metal Primer: MPI #26.

1. VOC Content: E Range of E1.

D. Waterborne Galvanized-Metal Primer: MPI #134.

1. VOC Content: E Range of E2.
2. Environmental Performance Rating: EPR 2.

E. Quick-Drying Primer for Aluminum: MPI #95.

1. VOC Content: E Range of E2.

2.5 WOOD PRIMERS

A. Exterior Latex Wood Primer: MPI #6.

1. VOC Content: E Range of E1.

B. Exterior Alkyd Wood Primer: MPI #5.

1. VOC Content: E Range of E2.

C. Exterior Oil Wood Primer: MPI #7.

1. VOC Content: E Range of E2.

2.6 EXTERIOR LATEX PAINTS

A. Exterior Latex (Flat): MPI #10 (Gloss Level 1).

1. VOC Content: E Range of E2.

B. Exterior Latex (Semigloss): MPI #11 (Gloss Level 5).

1. VOC Content: E Range of E2.

C. Exterior Latex (Gloss): MPI #119 (Gloss Level 6, except minimum gloss of 65 units at 60 deg).

1. VOC Content: E Range of E2.

2.7 EXTERIOR ALKYD PAINTS

A. Exterior Alkyd Enamel (Flat): MPI #8 (Gloss Level 1).

1. VOC Content: E Range of E1.

B. Exterior Alkyd Enamel (Semigloss): MPI #94 (Gloss Level 5).

1. VOC Content: E Range of E2.

C. Exterior Alkyd Enamel (Gloss): MPI #9 (Gloss Level 6).

1. VOC Content: E Range of E2.

2.8 QUICK-DRYING ENAMELS

A. Quick-Drying Enamel (Semigloss): MPI #81 (Gloss Level 5).

1. VOC Content: E Range of E2.

B. Quick-Drying Enamel (High Gloss): MPI #96 (Gloss Level 7).

1. VOC Content: E Range of E2.

2.9 TEXTURED AND HIGH-BUILD COATINGS

A. Latex Stucco and Masonry Textured Coating: MPI #42.

1. VOC Content: E Range of E3.

B. High-Build Latex (Exterior): MPI #40.

1. VOC Content: E Range of E2.

2.10 ALUMINUM PAINT

A. Aluminum Paint: MPI #1.

1. VOC Content: E Range of E2.

2.11 FLOOR COATINGS

A. Interior/Exterior Clear Concrete Floor Sealer (Water Based): MPI #99.

1. VOC Content: E Range of E2.

B. Interior/Exterior Clear Concrete Floor Sealer (Solvent Based): MPI #104.

1. VOC Content: E Range of E2.

C. Interior/Exterior Latex Floor and Porch Paint (Low Gloss): MPI #60 (maximum Gloss Level 3).

1. VOC Content: E Range of E2.
2. Environmental Performance Rating: EPR 3.

D. Exterior/Interior Alkyd Floor Enamel (Gloss): MPI #27 (Gloss Level 6).

1. VOC Content: E Range of E2.
2. Additives: Manufacturer's standard additive to increase skid resistance of painted surface.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.
4. Plaster: 12 percent.
5. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION AND APPLICATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

D. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.3 EXTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex System: MPI EXT 3.1A.

a. Prime Coat: Exterior latex matching topcoat.
b. Intermediate Coat: Exterior latex matching topcoat.
c. Topcoat: Exterior latex (flat), (semigloss) or (gloss).

2. Latex Aggregate/Latex System: MPI EXT 3.1 B.

a. Prime Coat: Latex stucco and masonry textured coating.
b. Intermediate Coat: Exterior latex matching topcoat.
c. Topcoat: Exterior latex (flat), (semigloss) or (gloss).

3. Latex Over Alkali-Resistant Primer System: MPI EXT 3.1K.

a. Prime Coat: Alkali-resistant primer.
b. Intermediate Coat: Exterior latex matching topcoat.
c. Topcoat: Exterior latex (flat), (semigloss) or (gloss).

4. High-Build Latex System: MPI EXT 3.1L, applied to form dry film thickness of not less than 10 mils.

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.

c. Topcoat: High-build latex (exterior).

5. Latex Aggregate System: MPI EXT 3.1N.

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Latex stucco and masonry textured coating.

B. Concrete Substrates, Traffic Surfaces:

1. Latex Floor Paint System: MPI EXT 3.2A.

a. Prime Coat: Interior/exterior latex floor and porch paint (low gloss).
b. Intermediate Coat: Interior/exterior latex floor and porch paint (low gloss).
c. Topcoat: Interior/exterior latex floor and porch paint (low gloss).

2. Alkyd Floor Enamel System: MPI EXT 3.2D.

a. Prime Coat: Exterior/interior alkyd floor enamel (gloss).
b. Intermediate Coat: Exterior/interior alkyd floor enamel (gloss).
c. Topcoat: Exterior/interior alkyd floor enamel (gloss).

3. Clear Sealer System: MPI EXT 3.2G.

a. Prime Coat: Interior/exterior clear concrete floor sealer (solvent based).
b. Intermediate Coat: Interior/exterior clear concrete floor sealer (solvent based).
c. Topcoat: Interior/exterior clear concrete floor sealer (solvent based).

4. Water-Based Clear Sealer System: MPI EXT 3.2H.

a. Prime Coat: Interior/exterior clear concrete floor sealer (water based).
b. Intermediate Coat: Interior/exterior clear concrete floor sealer (water based).
c. Topcoat: Interior/exterior clear concrete floor sealer (water based).

C. Steel Substrates:

1. Quick-Drying Enamel System: MPI EXT 5.1A.

a. Prime Coat: Quick-drying alkyd metal primer.
b. Intermediate Coat: Quick-drying enamel matching topcoat.
c. Topcoat: Quick-drying enamel (semigloss).

2. Alkyd System: MPI EXT 5.1D.

a. Prime Coat: Alkyd anticorrosive metal primer.
b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
c. Topcoat: Exterior alkyd enamel (flat), (semigloss) or (gloss).

3. Aluminum Paint System: MPI EXT 5.1K.

a. Prime Coat: Alkyd anticorrosive metal primer.
b. Intermediate Coat: Aluminum paint.
c. Topcoat: Aluminum paint.

D. Galvanized-Metal Substrates:

1. Latex Over Water-Based Primer System: MPI EXT 5.3H.

a. Prime Coat: Waterborne galvanized-metal primer.
b. Intermediate Coat: Exterior latex matching topcoat.
c. Topcoat: Exterior latex (gloss).

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Wood.
2. Gypsum board.
3. Galvanized ferrous metals.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each finish and for each color and texture required.

C. Product List: Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.3 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Resident Engineer and Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
b. Other Items: Resident Engineer and Architect will designate items or areas required.

2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
3. Final approval of color selections will be based on benchmark samples.

a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

b. All exposed Simpson connectors/hardware to be painted to match existing components at the Visitor Center located at 1 Father Junipero Serra Trail, San Diego, CA 92119.

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
4. Floor Coatings: VOC not more than 100 g/L.
5. Shellacs, Clear: VOC not more than 730 g/L.
6. Shellacs, Pigmented: VOC not more than 550 g/L.
7. Flat Topcoat Paints: VOC content of not more than 50 g/L.
8. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.
9. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
10. Floor Coatings: VOC not more than 100 g/L.
11. Shellacs, Clear: VOC not more than 730 g/L.
12. Shellacs, Pigmented: VOC not more than 550 g/L.
13. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.

14. Dry-Fog Coatings: VOC content of not more than 400 g/L.
15. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 340 g/L.
16. Pre-Treatment Wash Primers: VOC content of not more than 420 g/L.

C. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
2. Restricted Components: Paints and coatings shall not contain any of the following:

    a. Acrolein.
    b. Acrylonitrile.
    c. Antimony.
    d. Benzene.
    e. Butyl benzyl phthalate.
    f. Cadmium.
    g. Di (2-ethylhexyl) phthalate.
    h. Di-n-butyl phthalate.
    i. Di-n-octyl phthalate.
    j. 1,2-dichlorobenzene.
    k. Diethyl phthalate.
    l. Dimethyl phthalate.
    m. Ethylbenzene.
    n. Formaldehyde.
    o. Hexavalent chromium.
    p. Isophorone.
    q. Lead.
    r. Mercury.
    s. Methyl ethyl ketone.
    t. Methyl isobutyl ketone.
    u. Methylene chloride.
    v. Naphthalene.
    w. Toluene (methylbenzene).
    x. 1,1,1-trichloroethane.
    y. Vinyl chloride.

D. Colors: As selected by Architect from manufacturer's full range.

2.2 PRIMERS/SEALERS

A. Interior Latex Primer/Sealer: MPI #50.

1. VOC Content: E Range of E1.
2. Environmental Performance Rating: EPR 1.

2.3 METAL PRIMERS

A. Alkyd Anticorrosive Metal Primer: MPI #79.

1. VOC Content: E Range of E1.

2.4 WOOD PRIMERS

A. Interior Latex-Based Wood Primer: MPI #39.

1. VOC Content: E Range of E1.
2. Environmental Performance Rating: EPR 1.

2.5 LATEX PAINTS

A. Institutional Low-Odor/VOC Latex (Low Sheen): MPI #144 (Gloss Level 2).

1. VOC Content: E Range of E3.
2. Environmental Performance Rating: EPR 4.5.

B. Institutional Low-Odor/VOC Latex (Semigloss): MPI #147 (Gloss Level 5).

1. VOC Content: E Range of E3.
2. Environmental Performance Rating: EPR 3.

2.6 FLOOR COATINGS

A. Interior/Exterior Clear Concrete Floor Sealer (Water Based): MPI #99.

1. VOC Content: E Range of E1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Wood: 15 percent.
3. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION AND APPLICATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

D. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:

1. Mechanical Work:

a. Uninsulated metal piping.
b. Uninsulated plastic piping.
c. Pipe hangers and supports.
d. Tanks that do not have factory-applied final finishes.
e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

2. Electrical Work:

a. Switchgear.
b. Panelboards.
c. Electrical equipment that is indicated to have a factory-primed finish for field painting.

E. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

F. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.3 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Traffic Surfaces:

1. Water-Based Clear Sealer System: MPI INT 3.2G.

a. First Coat: Interior/exterior clear concrete floor sealer (water based).
b. Topcoat: Interior/exterior clear concrete floor sealer (water based).

B. Steel Substrates:

1. Institutional Low-Odor/VOC Latex System: MPI INT 5.1S.

a. Prime Coat: Rust-inhibitive primer (water based).
b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
c. Topcoat: Institutional low-odor/VOC interior latex (low sheen) and (semigloss).

C. Dimension Lumber Substrates, Nontraffic Surfaces: Including exposed joists and exposed beams.

1. Institutional Low-Odor/VOC Latex System: MPI INT 6.2L.

a. Prime Coat: Interior latex-based wood primer.
b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
c. Topcoat: Institutional low-odor/VOC interior latex (flat) and (low sheen).

D. Gypsum Board Substrates:

1. Institutional Low-Odor/VOC Latex System: MPI INT 9.2M.

a. Prime Coat: Interior latex primer/sealer.
b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
c. Topcoat: Institutional low-odor/VOC interior latex (flat), (low sheen) and (semigloss).

END OF SECTION 099123

SECTION 099300 - STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes surface preparation and the application of wood finishes on the following substrates:

1. Exterior Substrates:

a. Exposed glue-laminated beams and columns.
b. Exposed dimension lumber (rough carpentry).
c. Dressed lumber (finish carpentry).
d. Exposed wood panel products.

2. Interior Substrates:

a. Exposed glue-laminated beams and columns.
b. Exposed dimension lumber (rough carpentry).
c. Dressed lumber (finish carpentry).
d. Exposed wood panel products.
e. T&G wood

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each finish and for each color and texture required.

C. Product List: Printout of MPI's current "MPI Approved Products List" for each product category specified in Part 2, with the product proposed for use highlighted.

1.3 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in its "MPI Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and finish systems indicated.

B. Mockups: Apply benchmark samples of each finish system indicated and each color selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each type of finish system and substrate.

    a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
    b. Other Items: Architect will designate items or areas required.

2. Final approval of stain color selections will be based on benchmark samples.

    a. If preliminary stain color selections are not approved, apply additional benchmark samples of additional stain colors selected by Architect at no added cost to Owner.

    b. Stain finishes to match existing at the Visitor Center at 1 Father Junipero Serra Trail, San Diego, CA 92119

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Material Compatibility:

1. Provide materials for use within each finish system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a finish system, provide products recommended in writing by manufacturers of topcoat for use in finish system and on substrate indicated.

B. VOC Content of Field-Applied Interior Primers, Stains, and Transparent Finishes: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to primers, stains, and transparent finishes that are applied in a fabrication or finishing shop:

1. Flat Primers: VOC content of not more than 50 g/L.
2. Nonflat Primers: VOC content of not more than 150 g/L.
3. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
4. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
5. Clear Wood Finishes, Lacquers: VOC not more than 550 g/L.
6. Floor Coatings: VOC not more than 100 g/L.

7. Shellacs, Clear: VOC not more than 730 g/L.
8. Stains: VOC not more than 250 g/L.

C. Stain Colors: As selected by Architect from manufacturer's full range.

2.2 WOOD FILLERS

A. Wood Filler Paste: MPI #91.

1. VOC Content: E Range of E2.

2.3 PRIMERS AND SEALERS

A. Exterior Alkyd Wood Primer: MPI #5.

1. VOC Content: E Range of E2.

B. Exterior Latex Wood Primer: MPI #6.

1. VOC Content: E Range of E2.

C. Exterior Oil Wood Primer: MPI #7.

1. VOC Content: E Range of E2.

D. Wood Preservative: MPI #37.

1. VOC Content: E Range of E1.

E. Alkyd Sanding Sealer: MPI #102.

1. VOC Content: E Range of E2.

F. Lacquer Sanding Sealer: MPI #84.

1. VOC Content: E Range of E2.

G. Shellac: MPI #88.

1. VOC Content: E Range of E2.

2.4 STAINS

A. Exterior Semitransparent Stain (Solvent Based): MPI #13.

1. VOC Content: E Range of E2.

B. Exterior Solid-Color Stain (Solvent Based): MPI #14.

1. VOC Content: E Range of E2.

C. Exterior, Solid-Color Latex Stain: MPI #16.

1. VOC Content: E Range of E2.

D. Stain for Wood Decks: MPI #33.

1. VOC Content: E Range of E3.

E. Interior Wood Stain (Semitransparent): MPI #90.

1. VOC Content: E Range of E2.

2.5 VARNISHES

A. Exterior Marine Spar Varnish (Gloss): MPI #28, Gloss Level 7.

1. VOC Content: E Range of E2.

B. Exterior Varnish (Gloss): MPI #29, Gloss Level 6.

1. VOC Content: E Range of E1.

C. Exterior Varnish (Semigloss): MPI #30, Gloss Level 5.

1. VOC Content: E Range of E1.

D. Interior Varnish (Flat): MPI #73, Gloss Level 1, alkyd type.

1. VOC Content: E Range of E2.

E. Interior Varnish (Semigloss): MPI #74, Gloss Level 5, alkyd type.

1. VOC Content: E Range ofE2.

F. Interior Varnish (Gloss): MPI #75, Gloss Level 6, alkyd type.

1. VOC Content: E Range of E2.

2.6 POLYURETHANE FINISHES

A. Two-Component Aliphatic Polyurethane (Clear): MPI #78.

1. VOC Content: E Range of E2.

B. Interior, Oil-Modified, Clear Urethane (Satin): MPI #57, Gloss Level 4.

1. VOC Content: E Range of E2.

C. Interior, Oil-Modified, Clear Urethane (Gloss): MPI #56, Gloss Level 6.

1. VOC Content: E Range of E2.

D. Moisture-Cured Clear Polyurethane (Flat): MPI #71, Gloss Level 1.

1. VOC Content: E Range of E2.

E. Moisture-Cured Clear Polyurethane (Gloss): MPI #31.

1. VOC Content: E Range of E2.

2.7 WATERBORNE ACRYLIC FINISHES

A. Waterborne Clear Acrylic (Satin): MPI #128, Gloss Level 4.

1. VOC Content: E Range of E2.
2. Environmental Performance Rating: EPR 2.

B. Waterborne Clear Acrylic (Semigloss): MPI #129, Gloss Level 5.

1. VOC Content: E Range of E2.
2. Environmental Performance Rating: EPR 2.

C. Waterborne Clear Acrylic (Gloss): MPI #130, Gloss Level 6.

1. VOC Content: E Range of E2.
2. Environmental Performance Rating: EPR 2.

2.8 LACQUERS

A. Lacquer (Clear Flat): MPI #87, Gloss Level 1.

1. VOC Content: E Range of E2.

B. Lacquer (Clear Satin): MPI #85, Gloss Level 4.

1. VOC Content: E Range of E2.

C. Lacquer (Clear Gloss): MPI #86, Gloss Level 6.

1. VOC Content: E Range of E2.

2.9 OIL FINISH

A. Danish Oil: MPI #92.

1. VOC Content: E Range of E3.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

1. Maximum Moisture Content of Wood Substrates: 15 percent when measured with an electronic moisture meter.
2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes.
3. Begin finish application only after unsatisfactory conditions have been corrected and surfaces are dry.
4. Beginning application of finish system constitutes Contractor's acceptance of substrate and conditions.

3.2 PREPARATION AND APPLICATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.

C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.3 INTERIOR WOOD-FINISH-SYSTEM SCHEDULE

A. Exposed Glue-Laminated Beam and Column Substrates:

1. Polyurethane Varnish Over Stain System: MPI INT 6.1J.

a. Stain Coat: Interior wood stain (semitransparent).
b. Two Finish Coats: Interior, oil-modified, clear urethane (gloss).

2. Polyurethane Varnish System: MPI INT 6.1D.

a. One Factory-Applied Finish Coat: Matching field-applied finish coats.
b. Two Field-Applied Finish Coats: Interior, oil-modified, clear urethane (gloss).

3. Moisture-Cured Clear Polyurethane Over Stain System: MPI INT 6.1S.

a. Stain Coat: Interior wood stain (semitransparent).

b. Two Finish Coats: Moisture-cured clear polyurethane (gloss).

B. Exposed Rough Carpentry Substrates:

1. Polyurethane Varnish Over Stain System: MPI INT 6.2J.

a. Stain Coat: Interior wood stain (semitransparent).
b. Two Finish Coats: Interior, oil-modified, clear urethane (satin).

2. Polyurethane Varnish System: MPI INT 6.2H.

a. Three Finish Coats: Interior, oil-modified, clear urethane (gloss).

C. Finish Carpentry Substrates:

1. Polyurethane Varnish Over Stain System: MPI INT 6.3E.

a. Stain Coat: Interior wood stain (semitransparent).
b. Two Finish Coats: Interior, oil-modified, clear urethane (gloss).

2. Polyurethane Varnish System: MPI INT 6.3K.

a. One Factory-Applied Finish Coat: Matching field-applied finish coats.
b. Two Field-Applied Finish Coats: Interior, oil-modified, clear urethane (gloss).

END OF SECTION 099300

SECTION 105113 - METAL LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Standard metal lockers with hinged doors.
2. Metal tops and filler panels.
3. Locker benches.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For metal lockers. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For units with factory-applied color finishes.

D. Maintenance data.

E. Warranty: Sample of special warranty.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Where metal lockers and benches are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1.

B. Preinstallation Conference: Conduct conference at Project site.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver master and control keys to Owner by registered mail or overnight package service.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.

1. Warranty Period for All-Welded Metal Lockers: Lifetime from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.

B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with A60 zinc-iron, alloy (galvannealed) coating designation.

C. Extruded Aluminum: ASTM B 221, alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated.

D. Steel Tube: ASTM A 500, cold rolled.

E. Particleboard: ANSI A208.1, Grade M-2.

F. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.

G. Anchors: Material, type, and size required for secure anchorage to each substrate.

1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls, and elsewhere as indicated, for corrosion resistance.
2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.2 HEAVY-DUTY METAL LOCKERS

A. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:

1. Art Metal Products; Champ Corridor Lockers.
2. DeBourgh Mfg. Co.; Sentry Corridor/Personnel Lockers.
3. List Industries Inc.; Marquis Protector.
4. Lyon Workspace Products, LLC; All-Welded Lockers.
5. Penco Products, Inc.; All-Welded Lockers.

B. Locker Arrangement: Double tier.

C. Material: Cold-rolled steel sheet.

D. Body: Assembled by welding body components together. Fabricate from unperforated steel sheet with 0.048-inch nominal-thickness backs and 0.060-inch nominal-thickness tops, bottoms, sides, and shelves.

E. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral door strike full height on vertical main frames.

F. Doors: One piece; fabricated from 0.075-inch nominal-thickness steel sheet; 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.
2. Door Style: Perforated vents.

G. 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. Knuckle Hinges: Steel, full loop, five or seven knuckles, tight pin; minimum 2 inches high. Provide no fewer than three hinges for each door more than 42 inches high.
2. Continuous Hinges: Manufacturer's standard, steel, full height.

H. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond face of door; pry and vandal resistant.

1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks or padlocks; positive automatic latching and prelocking.

a. Latch Hooks: Equip doors less than 48 inches (1219 mm) high with two latch hooks; fabricated from 0.120-inch (3.04-mm) nominal-thickness steel sheet; welded to full-height door strikes; with resilient silencer on each latch hook.
b. 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.

I. Built-in Combination Locks: Key-controlled, three-number dialing combination locks; capable of at least five combination changes made automatically with a control key.

1. Bolt Operation: Automatically locking spring bolt.

J. Equipment: Equip each metal locker with identification plate and the following unless otherwise indicated:

1. Single-Tier Units: Shelf, one double-prong ceiling hook, and two single-prong wall hooks.
2. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
3. Triple-Tier Units: One double-prong ceiling hook.
4. Coat Rods: For each compartment of double-tier metal lockers.

K. Accessories:

1. Legs: 6 inches high; formed by extending vertical frame members, or fabricated from 0.075-inch nominal-thickness steel sheet; welded to bottom of locker.

    a. Closed Front and End Bases: Fabricated from 0.036-inch nominal-thickness steel sheet.

2. Continuous Zee Base: Fabricated from, manufacturer's standard thickness, but not less than 0.060-inch nominal-thickness steel sheet.

    a. Height: 6 inches.

3. Continuous Sloping Tops: Fabricated from 0.048-inch nominal-thickness steel sheet, with a pitch of approximately 20 degrees.

    a. Closures: Hipped-end type.

4. Recess Trim: Fabricated from 0.048-inch nominal-thickness steel sheet.
5. Filler Panels: Fabricated from 0.048-inch nominal-thickness steel sheet.
6. Boxed End Panels: Fabricated from 0.048-inch nominal-thickness steel sheet.

L. Finish: powder coat.

1. Color(s): Two colors, with door one color and frame and body another color; as selected by Architect from manufacturer's full range.

2.3 KEYLESS LOCKS

A. Built-in, Card-Operated Locks: Self-contained units mounted on interior of door with replaceable lock cylinders keyed separately and master keyed. Mount instruction decals on both faces of door. Furnish one change card key for each lock and one master card key.

1. Bolt Operation: Manually locking deadbolt o [automatically locking spring bolt.

2.4 LOCKER BENCHES

A. Provide bench units with overall assembly height of 17-1/2 inches.

B. Bench Tops: Manufacturer's standard one-piece units, with rounded corners and edges.

1. Size: Minimum as indicated except provide minimum 20-inch- (508-mm-) wide tops where accessible benches are indicated.
2. Laminated clear hardwood with one coat of clear sealer on all surfaces and one coat of clear lacquer on top and sides.

C. Fixed Pedestals: Manufacturer's standard supports, with predrilled fastener holes for attaching bench top and anchoring to floor, complete with fasteners and anchors, and as follows:

1. Tubular Steel: 1-1/2-inch- diameter steel tubing threaded on both ends, with standard pipe flange at top and bell-shaped cast-iron base; with baked-enamel or powder-coat finish; anchored with exposed fasteners.

a. Color: As selected by Architect from manufacturer's full range.

2.5 FABRICATION

A. Fabricate metal lockers square, rigid, and without warp and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.

1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.

B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments. Factory weld frame members of each metal locker together to form a rigid, one-piece assembly.

C. Knocked-Down Construction: Fabricate metal lockers using nuts, bolts, screws, or rivets for preassembly at plant prior to shipping.

D. All-Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections; with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds flush.

E. Accessible Lockers: Fabricate as follows:

1. Locate bottom shelf no lower than 15 inches above the floor.
2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above the floor.

F. Hooks: Manufacturer's standard ball-pointed type, aluminum or steel; zinc plated.

G. Coat Rods: Fabricated from 1-inch- diameter steel; chrome finished.

H. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch high.

I. Continuous Base: Formed into channel or zee profile for stiffness, and fabricated in lengths as long as practical to enclose base and base ends of metal lockers; finished to match lockers.

J. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.

1. Sloping-top corner fillers, mitered.

K. Individual Sloping Tops: Fabricated in width to fit one locker frame in lieu of flat locker tops; with integral back; finished to match lockers. Provide wedge-shaped divider panels between lockers.

L. Recess Trim: Fabricated with minimum 2-1/2-inch face width and in lengths as long as practical; finished to match lockers.

M. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.

N. Boxed End Panels: Fabricated with 1-inch- wide edge dimension, and designed for concealing fasteners and holes at exposed ends of nonrecessed metal lockers; finished to match lockers.

1. Provide one-piece panels for double-row (back-to-back) locker ends.

O. Finished End Panels: Designed for concealing unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.

1. Provide one-piece panels for double-row (back-to-back) locker ends.

P. Center Dividers: Full-depth, vertical partitions between bottom and shelf; finished to match lockers.

2.6 STEEL SHEET FINISHES

A. Powder-Coat Finish: Immediately after cleaning and pretreating, electrostatically apply manufacturer's standard, baked-polymer, thermosetting powder finish. Comply with resin manufacturer's written instructions for application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install 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 and bottom of lockers.

B. All-Welded Metal Lockers: Connect groups together with standard fasteners, with no exposed fasteners on face frames.

C. Equipment and Accessories: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.

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.

4. Attach recess trim to recessed metal lockers with concealed clips.
5. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings.

6. Attach sloping-top units to metal lockers, with closures at exposed ends.
7. Attach boxed end panels with concealed fasteners to conceal exposed ends of nonrecessed metal lockers.
8. Attach finished end panels with fasteners only at perimeter to conceal exposed ends of nonrecessed metal lockers.

D. Fixed Locker Benches: Provide no fewer than two pedestals for each bench, uniformly spaced not more than 72 inches apart. Securely fasten tops of pedestals to undersides of bench tops, and anchor bases to floor.

E. Freestanding Locker Benches: Place benches in locations indicated on Drawings.

END OF SECTION

SECTION 113100 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Cooking equipment including ranges and microwave ovens.
2. Ventilation range hoods.
3. Refrigerator/freezers.
4. Icemakers.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated including ENERGY STAR documentation.

B. Samples: For each exposed finish.

C. Appliance Schedule: Use same designations indicated.

D. Maintenance data.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Residential Appliances: Comply with NAECA standards.

D. Energy Ratings: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer of each appliance specified agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.

1. Electric Range: One-year limited warranty for surface-burner elements.
2. Microwave Oven: One-year limited warranty for defects in the magnetron tube.
3. Refrigerator/Freezer: One-year limited warranty on the sealed refrigeration system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Basis-of-Design Product: The design for each residential appliance is based on the product named. Subject to compliance with requirements, provide either the product indicated or a comparable product by one of the other manufacturers specified.

2.2 COOKING APPLIANCES

A. Range freestanding, electric.

1. Basis-of-Design Product: Product indicated, or a comparable product approved by the City.
2. Type: Standard with electric oven.
3. Cooktop: Four electric burner elements.
4. Oven(s): One, electric.
5. Finish: As Indicated

B. Microwave Oven:

1. Basis-of-Design Product: Product indicated, or a comparable product approved by the City.
2. Oven Capacity: 2.2 cu. ft. (0.06 cu m).

C. Exhaust Hood:

1. Basis-of-Design Product: as indicated or approved equal.

2.3 REFRIGERATION APPLIANCES

A. Refrigerator/Freezer:

1. Basis-of-Design Product: as indicated or a comparable product approved by the City.

2. Type: Freestanding, frost-free, single-door, with freezer on bottom.

B. Icemaker:

1. Basis-of-Design Product: as indicated or a comparable product approved by the City.

2. Type: Under the counter.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.

B. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

C. Utilities: Refer to Divisions 15 and 16 and drawings for plumbing and electrical requirements.

END OF SECTION 113100

SECTION 28 31 11 - DESIGN/BUILD FIRE ALARM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general conditions, Division 1, and Basic Electrical Requirements (Section 26 05 00) are part of this section and the contract for this work and apply to this section as fully as if repeated herein.

B. Reference to other sections: The applicable requirements from other Division 26 sections required for a complete and operational system shall form a part of the electrical work and each section shall be thoroughly reviewed by the Contractor for application to all other sections.

1.2 DESCRIPTION

A. The Contractor shall design, furnish and install a complete and operating life safety, design/build fire alarm system in compliance with all applicable state and local codes and ordinances. The Contractor shall review the construction documents including architectural, mechanical, plumbing, electrical, etc. as required to properly coordinate with all design disciplines and include all coordination work in the design and cost. The Contractor shall coordinate with other design/build disciplines, including fire sprinkler systems, elevator systems, and include all coordination items in the fire alarm system design and cost. The Contractor shall submit completed drawings to the governing fire code authority and obtain design approval and construction permits as required. All costs necessary for a code-compliant system shall be included in the fire alarm system design/build cost.

B. The design/build system shall include the design, furnishing, installation, connection and testing of an addressable microprocessor controlled fire alarm system. It shall include, but not be limited to, alarm initiating devices, trouble indicating devices, main fire alarm control panel, auxiliary control devices, annunciation devices, annunciator panels, transducer panels, and wiring.

C. The alarm system shall comply with requirements of the latest version of NFPA Standard 72 for protected Premises Signaling Systems except as modified and supplemented by this specification.

1.3 SCOPE

A. A new intelligent reporting, microprocessor-controlled automatic and manual fire detection and alarm system shall be installed in accordance with all state and local requirements. As a minimum, the system shall monitor the following: Manual alarm, waterflow alarm switches, valve supervisory tamper switches, post indicator valves, back-flow preventer supervisory switches, smoke/heat detectors for elevator re-call, and door release, duct smoke detectors and/or area smoke detectors for fan stop and control of fire/smoke dampers, and heat detectors for elevator shut-down. The system shall include dry relay contacts for connection to a digital alarm communicator transmitter for Central Station Monitoring.

B. Basic Performance

1. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be

encoded on NFPA Style 4 (Class B) Signaling Line Circuits (SLC).
2. Initiation Device Circuits (IDC) shall be wired Class B (NFPA Style B) as part of an addressable device connected by the SLC Circuit.

1.4 BASIC SYSTEM FUNCTIONAL OPERATION

A. When an alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:

1. The system alarm LED on the control panel shall flash.
2. A local piezo electric signal in the control panel shall sound.
3. A backlit 80 character LCD display on the control panel shall indicate all information associated with the alarm condition, including the type of alarm point and its location within the protected premises.
4. History storage equipment shall log the information associated each new alarm control panel condition, along with time and date of occurrence.
5. All system output programs assigned via control-by-event programming corresponding to the particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.

1.5 SUBMITTALS

A. General:

1. Six copies of all submittals shall be submitted to the Architect/Engineer for review.
2. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

B. Shop Drawings:

1. Scaled drawings (1/8” equals 1’ 0”) shall be provided.
2. Include manufacturer's name, model numbers, ratings, power requirements, voltage drop calculations, battery back-up calculations, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
3. Show annunciator layout, configurations, and termination on the architect’s floor plans.
4. Provide additional documents as may be required by the governing code authority.

C. Manuals:

1. Submit simultaneously with the shop drawings, complete operating manuals listing the manufacturer's name(s), including technical data sheets.
2. Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.
3. Provide a clear and concise description of operation that gives, in detail, the alarm, supervisory, and trouble conditions.

D. Software Modifications

1. Provide the services of a factory trained and authorized technician to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 24 hours.
2. Provide all hardware, software, programming tools and documentation necessary to modify the alarm system on site

E. Certifications:

1. Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the installing contractor is an authorized representative of the major equipment manufacturer. Include names and addresses in the certification.

1.6 GUARANTEE

A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included.

1.7 QUALITY ASSURANCE AND STANDARDS

A. The specifications and standards listed below form a part of this specification. The system shall fully comply with the latest issue of these standards, if applicable.

B. National Fire Protection Association (NFPA) - USA:

C. Underwriters Laboratories Inc. (UL) - USA:

D. California State Building Codes.

E. All requirements of the Local fire authority.

1.8 APPROVALS:

A. The system shall have proper listing and/or approval from the following recognized agencies:

1. UL - Underwriters Laboratories Inc.
2. FM - Factory Mutual
3. CSFM - California State Fire Marshal
4. Local fire authority

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIAL, GENERAL

A. All equipment and components shall be new, and the manufacturer's current model.

B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations.

2.2 CONDUIT AND WIRE

A. Conduit:

1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.

2. Conduit shall not enter the alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the fire alarm system manufacturer.
3. Conduit shall be 3/4 inch minimum.

B. Wire:

1. All alarm system wiring shall be new.
2. Wiring shall be in accordance with local, state and national codes and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG.
3. All wire and cable shall be listed and/or approved by a recognized testing agency.
4. All field wiring shall be electrically supervised for open circuit and ground fault.

C. Terminal Boxes, Junction Boxes and Cabinets:

1. All boxes and cabinets shall be UL listed for their use and purpose.

2.3 MAIN ALARM CONTROL PANEL

A. The main control panel shall be equal to a NOTIFIER Model NFS-320 and shall contain a microprocessor based Central Processing Unit (CPU). The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent addressable smoke and thermal (heat) detectors, addressable modules, printer, annunciators, and other system controlled devices.

B. System Capacity and General Operation:

1. The control panel shall provide, or be capable of expansion to 198 intelligent/addressable devices.
2. The control panel shall include Form-C alarm, trouble, supervisory, and security relays rated at a minimum of 3.0 amps at 30 VDC. It shall also include four Class B (NFPA Style Y) or Class A (NFPA Style Z) programmable Notification Appliance Circuits.
3. The alarm control panel shall include a full featured operator interface control and annunciation panel that shall include a backlit Liquid Crystal Display (LCD), individual color coded system status LEDs, and an alphanumeric keypad for the field programming and control of the alarm system.
4. All programming or editing of the existing program in the system shall be achieved without special equipment and without interrupting the alarm monitoring functions of the alarm control panel. The system shall be fully programmable, configurable, and expandable in the field without the need for special tools, PROM programmers or PC based programmers. It shall not require replacement of memory ICs to facilitate programming changes.
5. The system shall allow the programming of any input to activate any output or group of outputs.

C. The main control panel shall provide the following features:

1. Drift compensation to extend detector accuracy over life. Drift compensation shall also include a smoothing feature, allowing transient noise signals to be filtered out.
2. Detector sensitivity test, meeting requirements of NFPA 72, Chapter 7.
3. Maintenance alert, with two levels (maintenance alert/maintenance urgent), to warn of excessive smoke detector dirt or dust accumulation.
4. The ability to display or print system reports.
5. Periodic detector test, conducted automatically by the software.

D. Signaling Line Circuits (SLC)

1. The system shall include one SLC. The SLC interface shall provide power to and communicate with up to 99 intelligent detectors (ionization, photoelectric or thermal) and 99 intelligent modules (monitor or control) for a system capacity of 198 devices. The SLC shall be capable of NFPA 72 Style 4, Style 6, or Style 7 (Class A or B) wiring.
2. The Loop Interface Board (LIB) shall receive analog information from all intelligent detectors to be processed to determine whether normal, alarm, pre-alarm, or trouble conditions exist for each detector. The software shall automatically maintain the detector's desired sensitivity level by adjusting for the effects of environmental factors, including the accumulation of dust in each detector. The analog information shall also be used for automatic detector testing and for the automatic determination of detector maintenance requirements.
3. The detector software shall meet NFPA 72, Chapter 7 requirements and be certified by UL as a calibrated sensitivity test instrument.
4. The detector software shall allow manual or automatic sensitivity adjustment.

E. Serial Interfaces

1. The system shall include two serial RS - 232 interfaces. Each interface shall be a means of connecting UL Listed Electronic Data Processing (EDP) peripherals.
2. The system shall include an RS – 485S port for the serial connection of optional annunciators and remote LCD displays.
3. The RS - 485 interface may be used for network connection to a proprietary receiving unit.

F. Notification Appliance Circuit (NAC) Module

1. The Notification Appliance Circuit module shall provide four fully supervised Class A or B (NFPA Style Z or Y) notification circuits.
2. The notification circuit capacity shall be 3.0 amperes maximum.

G. Control Relay Module

1. The control relay module shall provide eight Form-C auxiliary relay circuits rated at 5 amperes, 28 VDC.
2. Each relay circuit shall be capable of being activated (change in state) by any initiating device or from any combination of initiating devices.

H. Enclosures:

1. The control panel shall be housed in a UL-listed cabinet suitable for surface or semi-flush mounting. The cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish.
2. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators. For convenience, the door may be selected for either right or left hand hinging.

I. Power Supplies:

1. The main power supply for the alarm control panel shall provide 3.0 amps of available power for the control panel and peripheral devices.
2. The main power supply shall continuously monitor all field wires for earth ground conditions.
3. The main power supply shall provide a battery charger for 24 hours of standby using dual-rate charging techniques for fast battery recharge.
4. A separate auxiliary power supply for door holders shall be provided. Loss of 120 VAC

power to the auxiliary power supply shall release the door holders.
5. All circuits shall be power-limited, per UL864 requirements.

2.4 SYSTEM COMPONENTS

A. Waterflow Indicator:

1. Waterflow Switches shall be furnished by the Sprinkler Contractor.
2. Waterflow Switches shall be connected under this section but installed and adjusted by the sprinkler contractor.

B. Sprinkler and Valve Supervisory Switches

1. Each sprinkler system water supply control valve riser, zone control valve, and standpipe system riser control valve shall be equipped with a supervisory switch.
2. PIV (post indicator valve) or main gate valves shall be equipped with a supervisory switch.
3. Valve supervisory switches shall be connected under this section and furnished, installed, and adjusted for proper operation by the sprinkler contractor.

C. Serially Connected Annunciator, equal to NOTIFIER LCD-80

1. The annunciator shall communicate with the alarm control panel via a two wire RS – 485S (multi-drop) communications circuit.
2. The annunciator shall require no more than four wires for operation. Annunciation shall include: intelligent addressable points, system software zones, control relays, and notification appliance circuits. The following operations shall also be provided:

D. Door Holders

1. Door holders shall be furnished by the Hardware Contractor.
2. Door holders shall be connected and powered under this section but installed and adjusted by the hardware contractor.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

C. All detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas. Final device coordination shall be coordinated with the project architect.

D. Manual pull station shall be suitable for surface mounting or semiflush mounting as shown on the plans, and shall be installed 48 inches above the finished floor.

E. Smoke detector(s) at the top of the elevator hoistway(s) shall be mounted on a U.L. 10-B self closing and self locking access door(s). Access door(s) shall be provided and installed by other divisions of the specifications.

3.2 TEST

A. The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72, Chapter 7.

B. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

C. Close each sprinkler system flow valve and verify proper supervisory alarm at the main control panel.

D. Verify activation of all waterflow switches.

E. Open initiating device circuits and verify that the trouble signal actuates.

F. Open and short signaling line circuits and verify that the trouble signal actuates.

G. Ground all circuits and verify response of trouble signals.

H. Check installation, supervision, and operation of all intelligent smoke and heat detectors.

I. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the main control panel and the correct activation of the control points.

3.3 FINAL INSPECTION

A. At the final inspection, a factory trained representative of the manufacturer of the major equipment shall demonstrate that the system functions properly in every respect.

3.4 INSTRUCTION

A. Instruction shall be provided to the building operator as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

B. The Contractor shall provide a written "Sequence of Operation" which shall be included in the Operations Manual and reviewed during the training period.

END OF SECTION 28 31 11

MISSION TRAILS FIELD STATION EAST FORTUNA

14450 EQUESTRIAN CIRCLE, SAN DIEGO, CA 92071

CITY OF SAN DIEGO

CONTRACTOR'S RESPONSIBILITIES

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 A INJURY 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.V. 69 KV & HIGHER).

STORM WATER PROTECTION

1. TOTAL SITE DISTURBANCE AREA (ACRES) 0.78 ACRES
   HYDROLOGIC UNIT/ WATERSHED LOWER SAN DIEGO
   HYDROLOGIC SUBAREA NAME & NO. SANTEE & 907.12
2. THE CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS OF THE
   ☒ WPCP
   THE PROJECT IS SUBJECT TO MUNICIPAL STORM WATER PERMIT NO. R9-2013-0001 AS AMENDED BY R9-2015-0001 AND R9- 2015-0100
   ☐ SWPPP
   THE PROJECT IS SUBJECT TO MUNICIPAL STORM WATER PERMIT NO. R9-2013-0001 AS AMENDED BY R9-2015-0001 AND R9-2015-0100 AND CONSTRUCTION GENERAL PERMIT ORDER 2009-0009-DWQ AS AMENDED BY ORDER 2010-0014-DWQ AND 2012-0006-DWQ
   TRADITIONAL: RISK LEVEL [1] [2] [3]
   LUP- RISK TYPE [1] [2] [3]
3. CONSTRUCTION SITE PRIORITY
   ☐ ASBS ☐ HIGH ☐ MEDIUM ☒ LOW

FIRE NOTES

1. STRUCTURES IN THE COURSE OF CONSTRUCTION, ALTERATION OR DEMOLITION, INCLUDING THOSE IN UNDERGROUND LOCATIONS SHALL BE IN ACCORDANCE TO CFC CH. 33.
2. ADDRESS SHALL BE PROVIDED FOR ALL NEW AND EXISTING BUILDINGS IN A POSITION AS TO BE PLAINLY VISIBLE AND LEGIBLE FROM THE STREET OR ROAD FRONTING THE PROPERTY (CFC SEC. 505.1 FHPS POLICY P-00-6.
3. DECORATIVE MATERIALS SHALL BE MAINTAINED IN A FLAME RETARDANT CONDITION. (CAL CODE REGS., TIT. 19, SEC. 1173 & 1174, CFC SEC. 801.
4. AT LEAST ONE FIRE EXTINGUISHER WITH A MINIMUM RATING OF 2-A:20-B:C SHALL BE PROVIDED WITHIN 75' MAXIMUM TRAVEL DISTANCE FROM PUMPS, DISPENSERS OR STORAGE TANK FILL-PIPE OPENINGS. (CFC SEC. 2305.5, CAL. CODE REGS., TIT. 19, 3.29.)
5. COMPLETE PLANS AND SPECIFICATIONS FOR FIRE ALARM SYSTEMS; FIRE-EXTINGUISHING SYSTEMS, INCLUDING AUTOMATIC SPRINKLERS AND WET & DRY STANDPIPES; HALON SYSTEMS AND OTHER SPECIAL TYPES OF AUTOMATIC FIRE -EXTINGUISHING SYSTEMS; BASEMENT PIPE INLETS AND OTHER FIRE-PROTECTION SYSTEMS AND APPURTENANCES THERETO SHALL BE SUBMITTED TO FIRE AND HAZARD PREVENTION SERVICES FOR REVIEW AND APPROVAL PRIOR TO INSTALLATION. (CFC SEC. 901.2)
6. FIRE-EXTINGUISHING SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH CBC SEC. 906.9.1 THROUGH 906.9.3.
7. ALL VALVES CONTROLLING THE WATER SUPPLY FOR AUTOMATIC SPRINKLER SYSTEMS, PUMPS, TANKS, WATER LEVELS AND TEMPERATURES, CRITICAL AIR PRESSURES AND WATER FLOW SWITCHES ON ALL SPRINKLER SYSTEMS SHALL BE ELECTRICALLY SUPERVISED BY A LISTED FIRE ALARM CONTROL UNIT . (CBC SEC. 903.4)
8. FIRE ALARM SYSTEMS SHALL BE IN ACCORDANCE WITH CFC SEC. 907.
9. AT LEAST ONE FIRE EXTINGUISHER WITH A MINIMUM RATING OF 4-A-20-B:C SHALL BE PROVIDED OUTSIDE EACH MECHANICAL, ELECTRICAL, OR BOILER ROOM. (CFC SEC. 906.1, CAL. CODE REGS., TIT 19, SEC. 3.29)
10. FIRE PROTECTION, INCLUDING FIRE APPARATUS ACCESS ROADS AND WATER SUPPLIES FOR FIRE PROTECTION, SHALL BE INSTALLED AND MADE SERVICEABLE PRIOR TO AND DURING TIME OF CONSTRUCTION. (CFC SEC. 501.4 AND 503)
11. FIRE HYDRANTS SHALL COMPLY WITH FHPS POLICY F-96-01 FOR ON-SITE FIRE HYDRANTS.
12. FIRE HYDRANTS SYSTEMS SHALL COMPLY IN ACCORDANCE WITH CFC SEC. 507.1-507.5.6 AND APPENDIX C.
13. PROVIDE AN APPROVED KEY BOX IN AN APPROVED LOCATION (CFC SEC. 506.1, FHPS POLICY K-00-2)
14. EMERGENCY PLANS SHALL BE SUBMITTED TO FIRE AND HAZARD PREVENTION SERVICES FOR REVIEW AND APPROVAL PRIOR TO OCCUPANCY. (CFC SEC. 401, CAL. CODE REGS., TIT 19, SEC. 3.10)

DEFERRED SUBMITTAL REVIEW

FIRE SPRINKLER SYSTEM TO BE A DEFERRED SUBMITAL. SEE GENERAL NOTES: 63, 64, 65 & 66. ON SHEET G1.1

SYMBOL LEGEND

- A / A301 — SECTION NUMBER / SECTION NUMBER REFERENCE
- 1 / A501 — DETAIL NUMBER / SECTION NUMBER REFERENCE
- A / DA7.0B / C — INTERIOR ELEVATION REFERENCE
- A — GRID / COLUMN LINE REFERENCE
- 101 — ROOM REFERENCE
- 101 — DOOR REFERENCE, SEE DOOR SCHEDULE
- A — WINDOW REFERENCE, SEE WINDOW SCHEDULE
- 16.2 — CONSTRUCTION NOTE
- 1 — WALL TYPE, SEE WALL TYPES LEGEND
- A — COLOR / FINISH REFERENCE
- ILLUMINATED EXIT SIGN
- 1 — REVISION REFERENCE
- 1 HOUR FIRE SEPARATION
- NEW CONSTRUCTION
- DIMENSION TO CENTER OF STUD OR FACE OF CMU
- DIMENSION TO CENTERLINE OF OPENING
- DIMENSION TO ELEVATION AFF
- HIDDEN / PROJECTED LINE
- CEILING HEIGHT

RESPONSIBLE CHARGE

I HEREBY DECLARE THAT I AM THE ARCHITECT OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED REASONABLE CARE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME AS ARCHITECT OF ENGINEER OF WORK, OR MY RESPONSIBILITIES FOR PROJECT DESIGN.

SIGNATURE _____ DATE _____

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.
C	02/13/2018	A1.1, A1.3, A2.0, A3.2, A5.2, C-1, C-2, C-3, C-4, C-6	

WARNING

0 1/2 1

IF THIS BAR DOES NOT MEASURE 1" THEN THE DRAWING IS NOT TO SCALE

PROJECT DATA

LEGAL DESCRIPTION: RANCHO MISSION FANTA RHO, RESUB CC348 (330)

PROJECT ADDRESS: 14450 EQUESTRIAN CIRCLE, SAN DIEGO, CA, 92071

ASSESSORS PARCEL NO: 366-071-2200

PROJECT NAME: MISSION TRAILS FIELD STATION EAST FORTUNA

PROJECT OWNER: CITY OF SAN DIEGO PUBLIC WORKS
525 B STREET, STE 750, SAN DIEGO, CA 92101
ATTENTION:JORGE ACEVEDO
ASSOCIATE ENGINEER, PROJECT MANAGER
EMAIL: ACEVEDOJ@SANDIEGO.GOV
PHONE:619-553-6657

MAP: MAP 1703

ALLOW. HEIGHT: 30' HIGH

CONST. TYPE: TYPE V-B, NON-RATED

SPRINKLED: YES

PROPOSED OCC.: B - BUSINESS; WITH ACCESSORY S-2 - COMMERCIAL STORAGE (< 500 SF) (NON-SEPARATED)

PRIOR DEVELOPMENT: CDP/SDP: 40-0524

AREA CALCULATIONS:

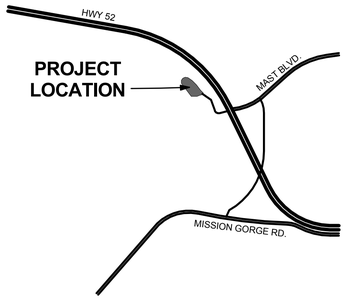
BUILDING AREA (FIRST FLOOR):	4,497 SF
BUILDING AREA (MEZZANINE):	444 SF
BUILDING AREA (YARD):	1,400 SF
BUILDING AREA (UNDER CANOPY):	3,068 SF
TOTAL AREA OF DISTURBANCE:	38,026 SF

FIRE ZONING

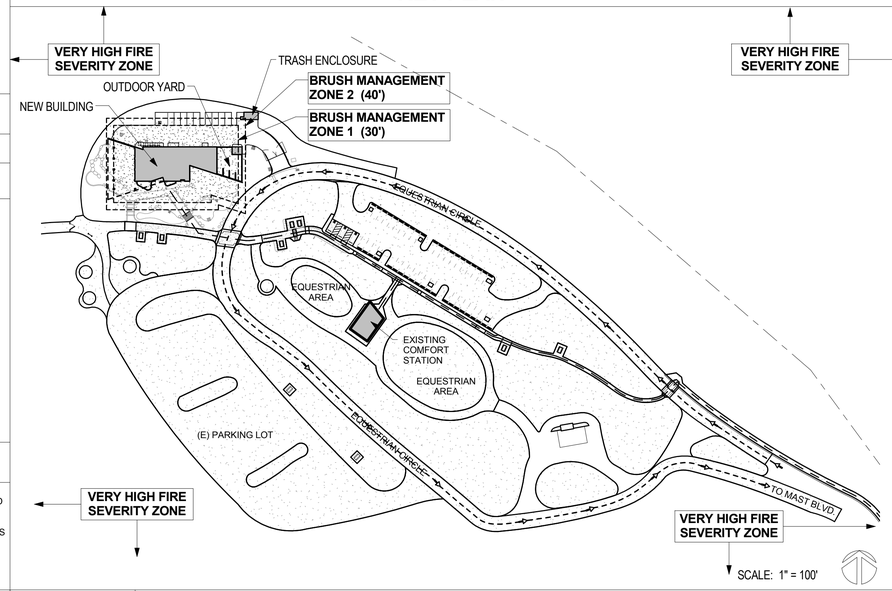
VERY HIGH FIRE SEVERITY ZONE
THE PROPOSED STRUCTURE IS ON A LOT THAT IS IN A VERY HIGH FIRE SEVERITY ZONE. THE MATERIALS AND METHODS OF CONSTRUCTION USED FOR THIS STRUCTURE, INCLUDING ATTACHED ACCESSORY STRUCTURES ARE IN ACCORDANCE WITH CHAPTER 7A, AS ADOPTED AND AMENDED BY THE CITY OF SAN DIEGO [SDMC 145.0701(b)]

BRUSH MANAGEMENT ZONES 1 & 2
THE PROPOSED STRUCTURE ISLOCATED IMMEDIATELY ADJACENT TO BRUSH MANAGEMENT ZONE ONE, AS DEFINED IN SDMC SECTION 142.0142. ALL VENTILATION IS DESIGNED TO BE DIRECTED AWAY FROM THE AONE. [CBC 706A.4(b)] ALL EXTERIOR GLAZING USED IN SKYLIGHTS, ROOFS AND SLOPED WALLS SHALL BE TEMPERED GLASS. [CBC 711A.2]

VICINITY MAP



KEY PLAN



SHEET INDEX

PROJECT SCOPE

NEW CONSTRUCTION OF A SINGLE STORY ADMINISTRATION AND COMMUNITY BUILDING ON AN EXISTING VACANT LOT. STRUCTURE TO CONSIST OF MASONRY WALLS, STANDING SEAM METAL ROOF, INTERIOR PARTITIONS, ENCLOSED OFFICE SPACE, LOBBY, RECEPTION AREA, MEETING ROOMS, EQUIPMENT YARD, GARAGE, 3,068SF OUTDOOR COVERED GATHERING AREA, TRASH ENCLOSURE AND PARKING. HVAC, INTERIOR / EXTERIOR LIGHTING, LANDSCAPING, AND A FIRE SUPPRESSION SYSTEM TO BE INCORPORATED.

PROJECT TEAM

ARCHITECT:	DAVY ARCHITECTURE 811 10TH AVENUE SAN DIEGO, CA 92101 (P) 619-238-3811 X 29 CONTACT: JIM MURRAY JMURRAY@DAVYARCHITECTURE.COM
CITY OF SAN DIEGO:	PUBLIC WORKS DEPARTMENT 525 B STREET, SUITE 750 SAN DIEGO, CA, 92101 (P) 619-533-6657 CONTACT: JORGE A. ACEVEDO ACEVEDOJ@SANDIEGO.GOV
CIVIL ENGINEER:	OMEGA CONSULTING ENGINEERS 4340 VIEWRIDGE AVE., SUITE B SAN DIEGO, CA 92123 (P) 858-634-8620 CONTACT: SEAN SAVAGE SEAN@OMEGA-CONSULTANTS.COM
LANDSCAPE ARCHITECT:	SPURLOCK POIRIER LANDSCAPE ARCHITECTS 2122 HANCOCK STREET SAN DIEGO, CA 92110 (P) 619-681-0090 X116 CONTACT: AMELIA CAPRON ACAPRON@SP-LAND.COM
STRUCTURAL ENGINEER:	GSSI STRUCTURAL ENGINEERS 3969 FIRST AVENUE, SUITE 200 SAN DIEGO, CA 92103 (P) 619-687-3810 CONTACT: OMAR GONZALEZ OOGONZALEZ@GSSI-SE.COM
MECHANICAL ENGINEER:	WALSH ENGINEERS 4499 RUFFIN RD., SUITE 100 SAN DIEGO, CA 92123 (P) 858-541-0788 CONTACT: BILL TZIOUVARAS BTZIOUVARAS@WALSHENGINEERS.COM
ELECTRICAL ENGINEER:	MICHAEL WALL ENGINEERING 4115 SORRENTO VALLEY BLVD. SAN DIEGO, CA 92121 (P) 858-638-0600 CONTACT: BRYAN WAYNE BWAYNE@MWALLENG.COM
FIRE PROTECTION:	TK1SC COLLABORATIVE 4225 EXECUTIVE SQUARE, SUITE 1050 LA JOLLA, CA 92037 (P) 858-362-6838 CONTACT: DEREK DUVAL DDUVAL@TK1SC.COM
FURNITURE CONSULTANT:	PARRON HALL 9655 GRANITE RIDGE DRIVE, SUITE 100 SAN DIEGO, CA 92123 (P) 619-701-7658 CONTACT: JAMILA LONDON JLONDON@PARONHALL.COM

G1.0

AS-BUILT INFORMATION

MATERIALS	MANUFACTURER

CONSULTANT

DAVY ARCHITECTURE
SERVICE-DISABLED VETERAN-OWNED
1053 TENTH AVENUE
SAN DIEGO, CA 92102
PHONE 619.238.3811
FAX 619.238.0442
WWW.DAVYARCHITECTURE.COM

PLANS FOR THE CONSTRUCTION OF MISSION TRAILS FIELD STATION EAST FORTUNA

TITLE SHEET

SPEC. NO. 1578

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 1 OF 123 SHEETS

APPROVED:
FOR CITY ENGINEER — DATE 9/12/2017
JASON GRANI — C77208
PRINT DCE NAME — RCE#

DESCRIPTION	BY	APPROVED	DATE	FILMED
PERMIT SET			08/31/2017	
C ADDENDUM C			02/13/2018	

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

WBS S-14016

JORGE ACEVEDO	PROJECT MANAGER
MARLON PEREZ	PROJECT ENGINEER
246-1761	CCS27 COORDINATE
1889-6321	CCS83 COORDINATE
39038 - 1 - D	

C ADDENDUM C

MISSION TRAILS FIELD STATION EAST FORTUNA

GENERAL NOTES

1. APPROVAL OF THESE PLANS BY THE CITY ENGINEER DOES NOT AUTHORIZE ANY WORK TO BE PERFORMED UNTIL A PERMIT HAS BEEN ISSUED.
2. THE APPROVAL OF THIS PLAN OR ISSUANCE OF A PERMIT BY THE CITY OF SAN DIEGO DOES NOT AUTHORIZE THE SUBDIVIDER AND OWNER TO VIOLATE ANY FEDERAL, STATE OR CITY LAWS, ORDINANCES, REGULATIONS, OR POLICIES, INCLUDING, BUT NOT LIMITED TO, THE FEDERAL ENDANGERED SPECIES ACT OF 1973 AND AMENDMENTS THERETO (16 USC SECTION 1531 ET.SEQ.)
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SURVEY MONUMENTS AND/OR VERTICAL CONTROL BENCHMARKS WHICH ARE DISTURBED OR DESTROYED BY CONSTRUCTION. A LAND SURVEYOR MUST FIELD LOCATE, REFERENCE, AND/OR PRESERVE ALL HISTORICAL OR CONTROLLING MONUMENTS PRIOR TO ANY EARTHWORK. IF DESTROYED, A LAND SURVEYOR SHALL REPLACE SUCH MONUMENTS WITH APPROPRIATE MONUMENTS. A CORNER RECORD OR RECORD OF SURVEY, AS APPROPRIATE, SHALL BE FILED AS REQUIRED BY THE PROFESSIONAL LAND SURVEYORS ACT, SECTION 8771 OF THE BUSINESS AND PROFESSIONS CODE OF THE STATE OF CALIFORNIA. IF ANY VERTICAL CONTROL IS TO BE DISTURBED OR DESTROYED, THE CITY OF SAN DIEGO FIELD SURVEY SECTION MUST BE NOTIFIED, IN WRITING, AT LEAST 3 DAYS PRIOR TO THE CONSTRUCTION. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE COST OF REPLACING ANY VERTICAL CONTROL BENCHMARKS DESTROYED BY THE CONSTRUCTION.
4. IMPORTANT NOTICE: SECTION 4216 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A "PERMIT TO EXCAVATE" WILL BE VALID. FOR YOUR DIG ALERT I.D. NUMBER, CALL UNDERGROUND SERVICE ALERT, TOLL FREE 1-800-422-4133, TWO DAYS BEFORE YOU DIG.
5. CONTRACTOR SHALL IMPLEMENT AN EROSION AND SEDIMENT CONTROL PROGRAM DURING THE PROJECT GRADING AND/OR CONSTRUCTION ACTIVITIES. THE PROGRAM SHALL MEET ALL APPLICABLE REQUIREMENTS OF THE STATE WATER RESOURCE CONTROL BOARD AND THE CITY OF SAN DIEGO MUNICIPAL CODE AND STORM WATER STANDARDS MANUAL.
6. "PUBLIC IMPROVEMENT SUBJECT TO DESUETUDE OR DAMAGE." IF REPAIR OR REPLACEMENT OF SUCH PUBLIC IMPROVEMENTS IS REQUIRED, THE OWNER SHALL OBTAIN THE REQUIRED PERMITS FOR WORK IN THE PUBLIC RIGHT-OF-WAY, SATISFACTORY TO THE PERMIT- ISSUING AUTHORITY.
7. ALL EXISTING AND/OR PROPOSED PUBLIC UTILITY SYSTEM AND SERVICE FACILITIES SHALL BE INSTALLED UNDERGROUND IN ACCORDANCE WITH SECTION 144.0240 OF THE MUNICIPAL CODE.
8. PRIOR TO ANY DISTURBANCE TO THE SITE, EXCLUDING UTILITY MARK-OUTS AND SURVEYING, THE CONTRACTOR SHALL MAKE ARRANGEMENTS FOR A PRE-CONSTRUCTION MEETING WITH THE CITY OF SAN DIEGO CONSTRUCTION MANAGEMENT AND FIELD SERVICES DIVISION (858) 627-3200.
9. DEVIATIONS FROM THESE SIGNED PLANS WILL NOT BE ALLOWED UNLESS A CONSTRUCTION CHANGE IS APPROVED BY THE CITY ENGINEER OR THE CHANGE IS REQUIRED BY THE CITY INSPECTOR.
10. AS-BUILT DRAWINGS MUST BE SUBMITTED TO THE RESIDENT ENGINEER PRIOR TO ACCEPTANCE OF THIS PROJECT BY THE CITY OF SAN DIEGO.
11. AN AS-GRADED GEOTECHNICAL REPORT AND A SET OF THE REDLINE GRADING PLANS SHALL BE SUBMITTED AT AREA 3 ON THE THIRD FLOOR OF DEVELOPMENT SERVICES WITHIN 30 CALENDAR DAYS OF THE COMPLETION OF GRADING. AN ADDITIONAL SET SHALL BE PROVIDED TO THE RESIDENT ENGINEER.
12. THE AREA WHICH IS DEFINED AS A NON GRADING AREA AND WHICH IS NOT TO BE DISTURBED SHALL BE STAKED PRIOR TO START OF THE WORK. THE PERMIT APPLICANT AND ALL OF THEIR REPRESENTATIVES OR CONTRACTORS SHALL COMPLY WITH THE REQUIREMENTS FOR PROTECTION OF THIS AREA AS REQUIRED BY ANY APPLICABLE AGENCY. ISSUANCE OF THE CITY'S GRADING PERMIT SHALL NOT RELIEVE THE APPLICANT OR ANY OF THEIR REPRESENTATIVES OR CONTRACTORS FROM COMPLYING WITH ANY STATE OR FEDERAL REQUIREMENTS BY AGENCIES INCLUDING BUT NOT LIMITED TO CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, CALIFORNIA DEPARTMENT OF FISH AND GAME. COMPLIANCE MAY INCLUDE OBTAINING PERMITS, OTHER AUTHORIZATIONS, OR COMPLIANCE WITH MANDATES BY ANY APPLICABLE STATE OR FEDERAL AGENCY.
13. CONTRACTOR SHALL REMOVE AND REPLACE ALL UTILITY BOXES SERVING AS HANDHOLES THAT ARE NOT IN "AS-NEW" CONDITION IN PROPOSED SIDEWALK. DAMAGED BOXES, OR THOSE THAT ARE NOT IN COMPLIANCE WITH CURRENT CODE SHALL BE REMOVED AND REPLACED WITH NEW BOXES, INCLUDING WATER, SEWER, TRAFFIC SIGNALS, STREET LIGHTS, DRY UTILITIES-SDG&E, COX, ETC. ALL NEW METAL LIDS SHALL BE SLIP RESISTANT (FRICTION FACTOR >/= 0.50) AND INSTALLED FLUSH WITH PROPOSED SIDEWALK GRADE. IF A SLIP RESISTANT METAL LID IS NOT COMMERCIALLY AVAILABLE FOR THAT USE, NEW BOXES AND LIDS SHALL BE INSTALLED.

GRADING NOTES

1. GRADING AS SHOWN ON THESE PLANS SHALL BE IN CONFORMANCE WITH CURRENT STANDARD SPECIFICATIONS AND CHAPTER 14, ARTICLE 2, DIVISION 1, OF THE SAN DIEGO MUNICIPAL CODE.
2. PLANT AND IRRIGATE ALL CUT AND FILL SLOPES AS REQUIRED BY ARTICLE 2, DIVISION 4, SECTION 142.0411 OF THE SAN DIEGO LAND DEVELOPMENT CODE AND ACCORDING TO SECTION IV OR THE LAND DEVELOPMENT MANUAL LANDSCAPE STANDARDS.
3. GRADED, DISTURBED, OR ERODED AREAS THAT WILL NOT BE PERMANENTLY PAVED, COVERED BY STRUCTURE, OR PLANTED FOR A PERIOD OVER 90 DAYS SHALL BE TEMPORARILY RE-VEGETATED WITH A NON-IRRIGATED HYDROSEED MIX, GROUND COVER, OR EQUIVALENT MATERIAL. SEE SHEET 9 FOR MIX AND SPECIFICATIONS

TRAFFIC CONTROL NOTE

THE CONTRACTOR SHALL SUBMIT A TRAFFIC CONTROL PLAN (11"X17") FOR APPROVAL PRIOR TO STARTING WORK. THE PLAN SHOULD BE SUBMITTED TO THE TRAFFIC SECTION WITH CONSTRUCTION MANAGEMENT AND FIELD SERVICES DIVISION.

TRUCK HAUL NOTES

THE CONTRACTOR SHALL SUBMIT A TRUCK HAUL ROUTE PLAN (11"X17") FOR APPROVAL PRIOR STARTING EXPORT OR IMPORT OF MATERIAL. THE PLAN SHOULD BE SUBMITTED TO THE TRAFFIC SECTION WITH CONSTRUCTION MANAGEMENT AND FIELD SERVICES DIVISION.

DIGALERT
CALL 8-1-1

SPECIAL NOTES

THE FOLLOWING NOTES ARE PROVIDED TO GIVE DIRECTIONS TO THE CONTRACTOR BY THE ENGINEER OF WORK. THE CITY ENGINEER'S SIGNATURE ON THESE PLANS DOES NOT CONSTITUTE APPROVAL OF ANY OF THESE NOTES, AND THE CITY WILL NOT BE RESPONSIBLE FOR THEIR ENFORCEMENT.

1. NEITHER THE OWNER NOR THE ENGINEER OF WORK WILL ENFORCE SAFETY MEASURES OR REGULATIONS. THE CONTRACTOR SHALL DESIGN, CONSTRUCT AND MAINTAIN ALL SAFETY DEVICES, INCLUDING SHORING, AND SHALL BE SOLELY RESPONSIBLE FOR CONFORMING TO ALL LOCAL, STATE AND FEDERAL SAFETY AND HEALTH STANDARDS, LAWS AND REGULATIONS. SAFETY FENCES SHALL BE PROVIDED BY THE CONTRACTOR WHERE REQUIRED BY THE CITY ENGINEER.
2. PRIOR TO ANY CONSTRUCTION OR EXCAVATING FOR THIS CONTRACT, THE LOCATION AND ELEVATION OF UNDERGROUND UTILITIES AND PROPOSED IMPROVEMENTS SHALL BE CONFIRMED BY FIELD MEASUREMENT. THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS HAS BEEN OBTAINED FROM AVAILABLE RECORDS ONLY AND MAY NOT REFLECT ALL EXISTING UTILITIES. LOCATIONS OF ALL EXISTING UTILITIES SHALL BE CONFIRMED BY FIELD MEASUREMENTS. PRIOR TO CONSTRUCTION CONTRACTOR OF WORK TO PERFORM EXPLORATORY EXCAVATIONS IN ORDER TO PROVIDE SUFFICIENT TIME PRIOR TO CONSTRUCTION FOR ANY NECESSARY PERMIT REVISIONS.CONTRACTOR SHALL NOTIFY ENGINEER OF WORK OF ANY DISCREPANCY.
3. THE CONTRACTOR SHALL POTHOLE OR UNCOVER ALL UTILITIES THAT MAYBE GRADED OVER, CONNECTED TO, JOINED, CROSSED, OR PARALLELED TO VERIFY BOTH HORIZONTAL AND VERTICAL LOCATION PRIOR TO ANY CONSTRUCTION. ANY CONFLICT OR DISCREPANCY SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION PRIOR TO CONSTRUCTION. OTHERWISE THE CONTRACTOR ACCEPTS FULL RESPONSIBILITY FOR ANY ADDITIONAL CONSTRUCTION OR RELOCATION COSTS.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING, RELOCATING, MAINTAINING, AND OR REMOVAL OF EXISTING UTILITIES WHEN IN CONFLICT WITH PROPOSES IMPROVEMENTS.
5. CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN HEREON AND ANY OTHER EXISTING LINES NOT OF RECORD OR SHOWN ON THESE PLANS.
6. WHERE TRENCHES ARE ADJACENT TO FUTURE BUILDING SITES, SOILS REPORTS SHALL BE SUBMITTED TO THE ENGINEER OF WORK BY A QUALIFIED SOILS ENGINEER WHICH CERTIFY* THAT TRENCH BACKFILL WAS COMPACTED AS DIRECTED BY THE SOILS ENGINEER IN ACCORDANCE WITH THE ON-SITE EARTHWORK SPECIFICATIONS. * AS DEFINED IN AND LIMITED IN SECTION 6735.5 OF THE BUSINESS AND PROFESSIONAL CODE OF CALIFORNIA.
7. CONTRACTOR SHALL ADJUST EXISTING WATER VALVE COVERS, CLEANOUT COVERS AND SEWER MANHOLE COVERS, ETC., TO GRADE WHERE NECESSARY.
8. ANY RETAINING WALLS SHOWN ON THESE PLANS AS PER SEPARATE PERMIT SHALL BE CONSIDERED AS FOR INFORMATION ONLY. A SEPARATE BUILDING PERMIT AND INSPECTION WILL BE REQUIRED FROM THE BUILDING INSPECTION DEPARTMENT FOR THEIR CONSTRUCTION.
9. THE BOTTOM OF ALL EXCAVATIONS SHALL BE OBSERVED BY A GEOTECHNICAL ENGINEER.
10. CONTRACTOR TO REMOVE/REPLACE/RELOCATE ANY LANDSCAPING OR HARDSCAPING WHICH CONFLICTS IN ANY WAY WITH THE INSTALLATION OR PROPER FUNCTIONING OF THE PROPOSED IMPROVEMENTS.
11. THE CONTRACTOR SHALL REPLACE ALL DESTROYED OR DAMAGED SURFACE IMPROVEMENT WITH IMPROVEMENT EQUAL OR SUPERIOR.
12. PRIOR TO ANY CONSTRUCTION THE CONTRACTOR IS TO COORDINATE PLANS WITH ALL OTHER DISCIPLINES AND NOTIFY ENGINEER OF WORK OF ANY DISCREPANCIES.
13. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR OR DEVELOPER TO ACQUIRE AND ENFORCE ALL NECESSARY TRAFFIC CONTROL PERMITS NEEDED TO SAFELY CONDUCT WORK IN THE PUBLIC RIGHT OF WAY. CONTRACTOR OR DEVELOPER/OWNER MUST COORDINATE ALL TRAFFIC CONTROL WITH THE AGENCY OF JURISDICTION.
14. CONTRACTOR SHALL EMPLOY INDIVIDUALS WHO ARE FAMILIAR WITH ALL CODES RELATED TO THE VARIOUS AREAS OF WORK AND CONSTRUCT THE INTENT OF THESE PLANS TO MEET ALL LOCAL, STATE AND FEDERAL REQUIREMENTS.
16. DURING ACTIVE CONSTRUCTION, AREAS SHALL BE WATERED TO REDUCE FUGITIVE DUST.
17. CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY. THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND THE ENGINEER HARMLESS FROM ANY AND ALL LIABILITY REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THE PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR ENGINEER.
18. CONTRACTOR SHALL CONSTRUCT AREA DRAINS ABOVE FINISHED GRATE ELEVATION AND ARE TO BE ADJUSTED TO MATCH FINISHED LANDSCAPE AND PROVIDE POSITIVE DRAINAGE, SHALL ANY DISCREPANCY ARISE THE CONTRACTOR IS TO NOTIFY THE ENGINEER OF WORK IMMEDIATELY.
19. CONTRACTOR SHALL MAKE ALL NECESSARY ADJUSTMENTS AND UNDERCUTS FOR SOIL AMENDMENTS, SODS ETC. TO ENSURE THAT THE FINISH GRADES ARE ESTABLISHED AS INDICATED ON THESE PLANS. THE GRADES REFLECTED HEREON SHALL BE DELIVERED AS THE FINAL CONDITION, POST LANDSCAPING.
20. THE CONTRACTOR SHALL BE RESPONSIBLE TO INSURE THAT ALL SLOPES, PADS, CURBS, INLETS AND SIDEWALKS ARE BUILT IN ACCORDANCE WITH THESE PLANS AND APPLICABLE CODES AND LAWS. IF THERE IS ANY QUESTION REGARDING THESE PLANS OR FIELD STAKES, THE CONTRACTOR SHALL REQUEST AN INTERPRETATION BEFORE DOING ANY WORK BY CALLING THE ENGINEER AT (858) 634-8620.

EARTHWORK QUANTITIES

TOTAL AMOUNT OF SITE TO BE GRADED: 0.78 ACRES
PERCENT OF TOTAL SITE TO BE GRADED: 100%
AMOUNT OF SITE WITH 25% NATURAL SLOPES OR GREATER: 100%

GRADED AREA:	0.78	ACRES	MAX CUT DEPTH:	3.5 FT
CUT:	1,918	CY	MAX FILL SLOPE RATIO:	2:1
FILL:	21	CY	MAX FILL DEPTH:	0.5 FT
EXPORT:	1,897	CY	MAX FILL SLOPE RATIO:	2:1

THIS PROJECT PROPOSES TO EXPORT 1,897 CUBIC YARDS OF MATERIAL FROM THIS SITE. ALL EXPORT MATERIAL SHALL BE DISCHARGED TO A LEGAL DISPOSAL SITE. THE APPROVAL OF THIS PROJECT DOES NOT ALLOW PROCESSING AND SALE OF THE MATERIAL. ALL SUCH ACTIVITIES REQUIRE A SEPARATE CONDITIONAL USE PERMIT.

NOTE:
SHOW FOR BIDDING ESTIMATE PURPOSE ONLY. CONTRACTOR SHALL BE RESPONSIBLE FOR REVIEWING ALL DOCUMENTS AND PLANS TO MAKE ESTIMATE. CONTRACTOR SHALL BE RESPONSIBLE FOR EXPORTING ALL MATERIALS TO COMPLETE PROJECT.

EROSION & SEDIMENT CONTROL NOTES

PRIOR TO ANY SOIL DISTURBANCE, TEMPORARY EROSION AND SEDIMENT CONTROLSHALL BE INSTALLED BY THE CONTRACTOR OR QUALIFIED PERSON(S) AS INDICATED BELOW:

1. ALL REQUIREMENTS OF THE CITY OF SAN DIEGO "LAND DEVELOPMENT MANUAL, STORM WATER STANDARDS" MUST BE INCORPORATED INTO THE DESIGN AND CONSTRUCTION OF THE PROPOSED GRADING/IMPROVEMENTS CONSISTENT WITH THE APPROVED STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND/OR WATER POLLUTION CONTROL PLAN (WPCP) FOR CONSTRUCTION LEVEL BMP'S AND, IF APPLICABLE, THE WATER QUALITY TECHNICAL REPORT (WQTR) FOR POST CONSTRUCTION TREATMENT CONTROL BMP'S.
2. THE CONTRACTOR SHALL INSTALL AND MAINTAIN ALL STORM DRAIN INLETS. INLET PROTECTION IN THE PUBLIC RIGHT OF WAY MAY BE TEMPORARILY REMOVED WHERE IT IS PRONE TO FLOODING PRIOR TO A RAIN EVENT AND REINSTALLED AFTER RAIN IS OVER.
3. ALL CONSTRUCTION BMPS SHALL BE IN PLACE AT THE END OF EACH WORKING DAY WHEN RAIN IS IMMINENT.
4. THE CONTRACTOR SHALL ONLY GRADE, INCLUDING CLEARING AND GRUBBING, AREAS FOR WHICH THE CONTRACTOR OR QUALIFIED PERSON CAN PROVIDE EROSION AND SEDIMENT CONTROL MEASURES.
5. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ALL SUB-CONTRACTORS AND SUPPLIERS ARE AWARE OF ALL STORM WATER QUALITY MEASURES AND IMPLEMENT SUCH MEASURES. FAILURE TO COMPLY WITH THE APPROVED SWPPP/WPCP WILL RESULT IN THE ISSUANCE OF CORRECTION NOTICES, CITATIONS, CIVIL PENALTIES AND/OR STOP WORK NOTICES.
6. THE CONTRACTOR OR QUALIFIED PERSON SHALL BE RESPONSIBLE FOR CLEANUP OF ALL SILT, DEBRIS AND MUD ON AFFECTED AND ADJACENT STREET(S) AND WITHIN STORM DRAIN SYSTEM DUE TO CONSTRUCTION VEHICLES/EQUIPMENT AND CONSTRUCTION ACTIVITY AT THE END OF EACH WORK DAY.
7. THE CONTRACTOR SHALL PROTECT NEW AND EXISTING STORM WATER CONVEYANCE SYSTEMS FROM SEDIMENTATION, CONCRETE RINSE, OR OTHER CONSTRUCTION RELATED DEBRIS AND DISCHARGES WITH THE APPROPRIATE BMPS THAT ARE ACCEPTABLE TO THE ENGINEER AND AS INDICATED IN THE SWPPP/WPCP
8. THE CONTRACTOR OR QUALIFIED PERSON SHALL CLEAR DEBRIS, SILT AND MUD FROM ALL DITCHES AND SWALES PRIOR TO AND AFTER EACH RAIN EVENT.
9. IF A NON-STORM WATER DISCHARGE LEAVES THE SITE, THE CONTRACTOR SHALL IMMEDIATELY STOP THE ACTIVITY AND REPAIR THE DAMAGES. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER OF THE DISCHARGE. AS SOON AS PRACTICAL, ANY AND ALL WASTE MATERIAL, SEDIMENT AND DEBRIS FROM EACH NON STORM WATER DISCHARGE SHALL BE REMOVED FROM THE STORM DRAIN CONVEYANCE SYSTEM AND PROPERLY DISPOSED OF BY THE CONTRACTOR.
10. EQUIPMENT AND WORKERS FOR EMERGENCY WORK SHALL BE MADE AVAILABLE AT ALL TIMES. ALL NECESSARY MATERIALS SHALL BE STOCKPILED ON SITE AT CONVENIENT LOCATIONS TO FACILITATE RAPID DEPLOYMENT OF CONSTRUCTION BMPS WHEN RAIN IS IMMINENT.
11. THE CONTRACTOR SHALL RESTORE AND MAINTAIN ALL EROSION AND SEDIMENT CONTROL BMPS TO WORKING ORDER YEAR ROUND.
12. THE CONTRACTOR SHALL INSTALL ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES DUE TO GRADING INACTIVITY OR UNFORESEEN CIRCUMSTANCES TO PREVENT NON-STORM WATER AND SEDIMENT-LADEN DISCHARGES.
13. THE CONTRACTOR SHALL BE RESPONSIBLE AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT PUBLIC TRESPASS ONTO AREAS WHERE IMPOUNDED WATERS CREATE A HAZARDOUS CONDITION.
14. ALL EROSION AND SEDIMENT CONTROL MEASURES PROVIDED PER THE APPROVED SWPPP/WPCP SHALL BE INSTALLED AND MAINTAINED. ALL EROSION AND SEDIMENT CONTROL FOR INTERIM CONDITIONS SHALL BE PROPERLY DOCUMENTED AND INSTALLED TO THE SATISFACTION OF THE RESIDENT ENGINEER.
15. UPON NOTIFICATION BY THE RESIDENT ENGINEER, THE CONTRACTOR SHALL ARRANGE FOR MEETINGS DURING OCTOBER 1ST TO APRIL 30TH FOR PROJECT TEAM (GENERAL CONTRACTOR, QUALIFIED PERSON, EROSION CONTROL SUBCONTRACTOR IF ANY, ENGINEER OF WORK, OWNER/DEVELOPER AND THE RESIDENT ENGINEER) TO EVALUATE THE ADEQUACY OF THE EROSION AND SEDIMENT CONTROL MEASURES AND OTHER BMPS RELATIVE TO ANTICIPATED CONSTRUCTION ACTIVITIES.
16. THE CONTRACTOR SHALL CONDUCT VISUAL INSPECTIONS DAILY AND MAINTAIN ALL BMPS AS NEEDED. VISUAL INSPECTIONS AND MAINTENANCE OF ALL BMPS SHALL BE CONDUCTED BEFORE, DURING AND AFTER EVERY RAIN EVENT AND EVERY 24 HOURS DURING ANY PROLONGED RAIN EVENT. THE CONTRACTOR SHALL MAINTAIN AND REPAIR ALL BMPS AS SOON AS POSSIBLE AS SAFETY ALLOWS.
17. CONSTRUCTION ENTRANCE AND EXIT AREA. TEMPORARY CONSTRUCTION ENTRANCE AND EXIT AREA SHALL BE ON LEVEL, STABILIZED GROUND. THE ENTRANCE AND EXIT AREA SHALL BE CONSTRUCTED BY OVERLAYING THE STABILIZED ACCESS AREA WITH 3 TO 6"DIAMETER STONES. THE AREA SHALL BE MINIMUM 50' LONG X 30' WIDE. IN LIEU OF STONE COVERED AREA, THE CONTRACTOR MAY CONSTRUCT RUMBLE RACKS OF STEEL PANELS WITH RIDGES MINIMUM 20' LONG X 30' WIDE CAPABLE OF PREVENTING THE MIGRATION OF CONSTRUCTION MATERIALS INTO THE TRAVELED WAYS.
18. PERFORMANCE STANDARDS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING WATER POLLUTION CONTROL MEASURES BASED ON PERFORMANCE STANDARDS. PERFORMANCE STANDARDS SHALL INCLUDE:
    - A. NON-STORM WATER DISCHARGES FROM THE SITE SHALL NOT OCCUR TO THE MEP3. STORM WATER DISCHARGES SHALL BE FREE OF POLLUTANTS INCLUDING SEDIMENT TO THE MEP.
    - B. EROSION SHALL BE CONTROLLED BY ACCEPTABLE BMPS TO THE MEP. IF RILLS AND GULLIES APPEAR THEY SHALL BE REPAIRED AND ADDITIONAL BMPS INSTALLED TO PREVENT A REOCCURRENCE OF EROSION.
    - C. AN INACTIVE AREA SHALL BE PROTECTED TO PREVENT POLLUTANT DISCHARGES. A SITE OR PORTIONS OF A SITE SHALL BE CONSIDERED INACTIVE WHEN CONSTRUCTION ACTIVITIES HAVE CEASED FOR A PERIOD OF 14 OR MORE CONSECUTIVE DAYS.

TOPOGRAPHY SOURCE:

FIELD SURVEYING PREFORMED BY:
OMEGA LAND SURVEYING, INC.
4340 VIEWRIDGE AVENUE, SUITE B
SAN DIEGO, CA 92123
PERFORMED: APRIL 8/9, 2015

BENCHMARK

DESCRIPTION: BRASS PLUG IN TOP OF INLET
LOCATION: SOUTHEAST CORNER OF MAST BLVD & WEST HILLS PKWY
ELEVATION: 379.80 FEET (MSL)
SOURCE: CITY OF SAN DIEGO VERTICAL CONTROL AS SHOWN ON 31804-13-D

BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS SITE IS THE CCS-83 (ZONE VI, 1991.35 EPOCH) GRID BEARING BETWEEN STATIONS "52-12.8" AND "52-13.36L", AS SAID STATIONS ARE SHOWN ON COUNTY OF SAN DIEGO CONTROL DATA SHEETS (BOTH HAVING SECOND ORDER ACCURACY). QUOTED BEARINGS FROM REFERENCE MAPS OR DEEDS MAY OR MAY NOT BE IN THE TERMS OF SAID SYSTEM.

THE COMBINED SCALE FACTOR AT STATION "52-12.8" IS 0.9999897. GRID DISTANCE = GROUND DISTANCE x COMBINED SCALE FACTOR.

REFERENCE DRAWINGS

31804-D (MISSION TRAILS EAST FORTUNA EQUESTRIAN STAGING AREA)

LIST OF ABBREVIATIONS

AD	=	AREA DRAIN	LT	=	LIGHT
APC	=	ALTERNATIVE PIPE CULVERT	MIN.	=	MINIMUM
BF	=	BASEMENT FLOOR	MH	=	MANHOLE
BW	=	BOTTOM OF WALL	N	=	NORTH OR NORTHING
CONC	=	CONCRETE	P	=	PAVEMENT GRADE
CL	=	CENTER LINE	PCC	=	PORTLAND CEMENT CONC.
CO	=	CLEAN OUT	PIV	=	POST INDICATOR VALVE
COL	=	COLUMN	PROP.	=	PROPOSED
CY	=	CUBIC YARDS	PVC	=	POLYVINYL CHLORIDE
(°)	=	DEGREES	PVT	=	PRIVATE
Δ	=	DELTA OR CENTRAL ANGLE	R	=	RADIUS
DWY	=	DRIVEWAY	RIM	=	RIM ELEVATION
E	=	EAST OR EASTING	RD	=	ROOF DRAIN
EA	=	EACH	R/W	=	RIGHT OF WAY
EG	=	EXISTING GRADE	S	=	SOUTH
EL	=	ELEVATION	SD	=	STORM DRAIN
EP	=	EDGE OF PAVEMENT	SDGE	=	SAN DIEGO GAS & ELECTRIC
EX	=	EXISTING	SWR	=	SEWER
(')	=	FEET OR MINUTES	TC	=	TOP OF CURB
FF	=	FINISHED FLOOR	TEL	=	TELEPHONE
FG	=	FINISH GRADE	TYP	=	TYPICAL
FL	=	FLOW LINE	TW	=	TOP OF WALL
FS	=	FINISH SURFACE	VC	=	VITRIFIED CLAY
GB	=	GRADE BREAK	WTR	=	WATER METER
IE	=	INVERT ELEVATION			

STORM WATER PROTECTION NOTES

1. THIS PROJECT IS SUBJECT TO MUNICIPAL STORM WATER PERMIT ORDER NO. R9-2013-0001 (AS AMENDED BY R9-2015-0001 AND R9-2015-0100); AND RISK LEVEL/TYPE: CHECK ONE BELOW
   - ☒ WPCP
   - ☐ CGP RISK LEVEL 1 ☐ CGP LUP TYPE 1
   - ☐ CGP RISK LEVEL 2 ☐ CGP LUP TYPE 2
   - ☐ CGP RISK LEVEL 3 ☐ CGP LUP TYPE 3
2. WDID NO: N/A
3. CHECK ONE
   - ☐ THIS PROJECT WILL EXCEED THE MAXIMUM DISTURBED AREA LIMIT, THEREFORE A WEATHER TRIGGERED ACTION PLAN (WTAP) IS REQUIRED.
   - ☐ THIS PROJECT WILL FOLLOW PHASED GRADING NOT TO EXCEED FIVE (5) ACRES PER PHASE.
   - ☒ NOT APPLICABLE
4. THE CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS OF THE WPCP AS APPLICABLE.
5. WATERSHED: LOWER SAN DIEGO
6. HYDRAULIC SUB AREA NAME: SANTEE
7. HYDRAULIC SUB AREA NUMBER: 907.12

CONSTRUCTION SITE STORM WATER PRIORITY: LOW

DECLARATION OF RESPONSIBLE CHARGE

I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

WORK TO BE DONE

THE IMPROVEMENTS CONSIST OF THE FOLLOWING WORK TO BE DONE ACCORDING TO THESE PLANS AND THE SPECIFICATIONS AND STANDARD DRAWINGS OF THE CITY OF SAN DIEGO.

STANDARD SPECIFICATIONS:

DOCUMENT NO.	DESCRIPTION
PWPI070116-01	STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (GREENBOOK), 2015 EDITION
PWPI070116-02	CITY OF SAN DIEGO STANDARD SPECIFICATIONS FOR PUBLICWORKS CONSTRUCTION (WHITEBOOK), 2015 EDITION
PITS070112-04	CALIFORNIA DEPARTMENT OF TRANSPORTATION MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, 2012 EDITION
PITS070112-06	CALIFORNIA DEPARTMENT OF TRANSPORTATION U.S CUSTOMARY STANDARD SPECIFICATIONS, 2010 EDITION

STANDARD DRAWINGS:

DOCUMENT NO.	DESCRIPTION
PWPI070116-03	CITY OF SAN DIEGO STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, 2016 EDITION
PITS070112-05	CALIFORNIA DEPARTMENT OF TRANSPORTATION U.S. CUSTOMARY STANDARD PLANS, 2010 EDITION

(X) CONSTRUCTION NOTES:

NO.	DESCRIPTION	DETAIL/STANDARD	SYMBOL
1	6" CURB & GUTTER	SDG-151	
2	6" CURB	SDG-150	
3	0" CURB	C L/C-6	
4	ADA COMPLIANT OPEN-GRID PAVERS	M/C-6	
5	ADA STALL (2.0% MAX SLOPE ANY DIRECTION)	SDM-117	
6	PCC PAVEMENT MEDIUM BROOM (PARKING)*	(6"PCC/6"AB)	
7	AC PAVEMENT*	(4"AC/10"AB)	
8	CAST-IN-PLACE INLET (SIZE PER PLAN)	SDD-114	
9	AREA DRAIN	G/C-6	
10	PCC RIBBON GUTTER	K/C-6	
11	PLANTER WALL	PER ARCHITECTURAL	
12	BIORETENTION AREA	I/C-6	
13	PCC HEADWALL (H=2.66', L=3.0')	D-30 (MODIFIED)	
14	RIP RAP (W/NO. 2 BACKING) DIMENSIONS PER PLAN	-	
15	VEGETATED SWALE	F/C-6	
16	DECOMPOSED GRANITE PATHWAY (STABILIZED)	PER LANDSCAPE	
17	COBBLE HEADER	PER LANDSCAPE	
18	BOULDER	PER LANDSCAPE	
19	STEP	PER LANDSCAPE	
20	PEDESTRIAN BRIDGE	PER ARCHITECTURAL	
21	DEEPENED FOOTING (AMOUNT DEEPENED PER PLAN)	-	X'
22	UNDERGROUND SEWER HOLDING TANK	A/C-7	
23	WATER SERVICE BACKFLOW W/CAGED	SDW-155	
24	CORTEN STEEL HEADER	PER LANDSCAPE	
25	PERFORATED SUB-DRAIN	B/C-6	
26	ASPHALT PAVEMENT TRENCH RESURFACING	SDG-107	
27	FDC/PIV	A/C-6	
28	SEWER CLEANOUT	SDS-102	
29	CAST-IN-PLACE GRATED CONTROL STRUCTURE	D-29 & J/C-6	
30	PROTECTION POST BOLLARD	WM-04	
31	STORM DRAIN CLEANOUT	C/C-6	
32	POTABLE WATER TRENCH	SDW-110	--
33	PCC SIDEWALK	SDG-155	
34	PCC PAVEMENT MEDIUM BROOM (VEHICULAR)*	(6"PCC/7"AB)	
35	SEWER FLOOR DRAIN	D/C-6	
36	SHALLOW AREA DRAIN	E/C-6	
37	NORMALLY OPEN SOLENOID CONTROLLED SHUT OFF VALVE	-	-

* FINAL PAVEMENT SECTION PER GEOTECHNICAL CONSULTANT BASED ON FIELD-TESTED R-VALUE

LEGEND

EXISTING

SIZE & TYPE AS SHOWN — EXISTING UTILITY
M — EXISTING WATER METER
EXISTING FIRE HYDRANT
EXISTING CURB
589 — EXISTING CONTOUR
EXISTING CATCH BASIN

PROPOSED

900.00TC — TOP OF CURB ELEVATION
901.00P — PAVEMENT ELEVATION
902.00FS — FINISHED SURFACE ELEVATION
903.00FL — FLOW LINE ELEVATION
904.00FG — FINISHED GRADE ELEVATION

(W) — DOMESTIC WATER SERVICE
(S) — SEWER POINT OF CONNECTION
(IR) — IRRIGATION POINT OF CONNECTION
(RD) — ROOF DRAIN DOWNSPOUT LOCATION
DAYLIGHT LIMITS

C-1

CONSTRUCTION CHANGE / ADDENDUM			
CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN THE DRAWING IS NOT TO SCALE

The City of SAN DIEGO Public Works

OMEGA
ENGINEERING CONSULTANTS
4340 VIEWRIDGE AVE, SUITE B
SAN DIEGO, CALIFORNIA 92123
Phone: (858) 634-8620

REGISTERED PROFESSIONAL ENGINEER
ANDREW J. KANN
No. 50940
Exp. 9-30-19
CIVIL
STATE OF CALIFORNIA

PLANS FOR THE CONSTRUCTION OF MISSION TRAILS FIELD STATION EAST FORTUNA

CIVIL TITLE SHEET

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING AND CAPITAL PROJECTS DEPARTMENT
SHEET 5 OF 123 SHEETS

WBS S-14016

ISSUE FOR:
FOR CITY ENGINEER — DATE 9/12/2017

SUBMITTED BY: JORGE ACEVEDO, PROJECT MANAGER
CHECKED BY: MARLON PEREZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
100% C.D.	OEC			
PERMIT SET	OEC			
(C) ADDENDUM C		[signature]	2/13/18	

246-1761
CCS27 COORDINATE
1889-6321
CCS83 COORDINATE

CONTRACTOR ______ DATE STARTED ______
INSPECTOR ______ DATE COMPLETED ______

39038- 5 -D

(C) DETAIL ADDITION

ADDENDUM C

FILENAME: P:\DWG OMEGA\0285 MISSION TRAIL BLDG\AUTOCAD\0285-C1-COVER.DWG DATE: 2/13/2018 5:05:58 PM

CONSTRUCTION NOTES:

NO.	DESCRIPTION	DETAIL/STANDARD	SYMBOL
(1)	6" CURB & GUTTER	SDG-151	
(2)	6" CURB	SDG-150	
(3)	0" CURB		
(5)	ADA STALL (2.0% MAX SLOPE ANY DIRECTION)	SDM-117	
(10)	PCC RIBBON GUTTER		
(11)	PLANTER WALL	PER ARCHITECTURAL	
(13)	PCC HEADWALL (H=2.66', L=3.0')	D-30 (MODIFIED)	
(14)	RIP RAP (W/NO. 2 BACKING) DIMENSIONS PER PLAN	-	
(15)	VEGETATED SWALE		
(17)	COBBLE HEADER	PER LANDSCAPE	
(18)	BOULDER	PER LANDSCAPE	
(19)	STEP	PER LANDSCAPE	
(20)	PEDESTRIAN BRIDGE	PER ARCHITECTURAL	
(21)	DEEPENED FOOTING (AMOUNT DEEPENED PER PLAN)	-	X'
(24)	CORTEN STEEL HEADER	PER LANDSCAPE	
(30)	PROTECTION POST BOLLARD	WM-04	

OVER-EXCAVATION NOTES

ALL SOIL WITHIN 3 FEET OF THE DEEPEST PLANNED FOOTING BOTTOM LEVEL SHOULD BE EXCAVATED AND REPLACED WITH COMPATEC FILL WITH AN EXPANSION INDEX OF 20 OR LESS. EXCAVATIONS SHOULD EXTEND AT LEAST 5 FEET OUTSIDE THE PLANNED FOOTING PERIMETER.

INTERIOR SLABS-ON-GRADE

THE TOP 24" OF MATERIAL BELOW INTERIOR SLABS-ON-GRADE SHOULD HAVE AN EXPANSION INDEX OF 20 OR LESS.

EXTERIOR SLABS-ON-GRADE

THE TOP 24" OF MATERIAL BELOW EXTERIOR SLABS-ON-GRADE SHOULD HAVE AN EXPANSION INDEX OF 20 OR LESS.

PAVEMENT SECTIONS

THE TOP 12" OF SUBGRADE SHOULD BE SCARIFIED, MOISTURE CONDITIONED TO NEAR OPTIMUM MOISTURE CONTENT, AND COMPACTED TO AT LEAST 95% RELATIVE COMPACTION. ALL SOFT OR YIELDING AREAS SHOULD BE REMOVED AND REPLACED WITH COMPACTED FILL. THE AGGREGATE BASE SHOULD BE COMPACTED TO AT LEAST 95% RELATIVE COMPACTION. THE ASPHALT CONCRETE SHOULD BE COMPACTED TO AT LEAST 95% RELATIVE COMPACTION. ALL MATERIALS AND METHODS OF CONSTRUCTION SHOULD CONFORM TO GOOD ENGINEERING PRACTICES AND THE MINIMUM STANDARDS OF THE CITY OF SAN DIEGO.

SEE SHEET C-3 FOR SITE UTILITIES

C-2

PLANS FOR THE CONSTRUCTION OF
MISSION TRAILS FIELD STATION EAST FORTUNA

GRADING PLAN

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING AND CAPITAL PROJECTS DEPARTMENT
SHEET 6 OF 123 SHEETS

WBS S-14016

ISSUE FOR:

FOR CITY ENGINEER — DATE 9/12/2017

SUBMITTED BY: JORGE ACEVEDO, PROJECT MANAGER

CHECKED BY: MARLON PEREZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
100% C.D.	OEC			
PERMIT SET	OEC			
⚠ ADDENDUM C			2/13/18	

246-1761 CCS27 COORDINATE

1889-6321 CCS83 COORDINATE

CONTRACTOR _____ DATE STARTED _____

INSPECTOR _____ DATE COMPLETED _____

39038- 6 -D

CONSTRUCTION CHANGE / ADDENDUM			
CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN THE DRAWING IS NOT TO SCALE

The City of SAN DIEGO Public Works

OMEGA ENGINEERING CONSULTANTS
4340 VIEWRIDGE AVE, SUITE B
SAN DIEGO, CALIFORNIA 92123
Phone: (858) 634-8620

REGISTERED PROFESSIONAL ENGINEER — ANDREW J. KAMP — No. 50940 Exp. 9-30-19 — CIVIL — STATE OF CALIFORNIA

DIGALERT CALL 8-1-1

⚠ PLANTER/GRADE BREAK EXTENSION

ADDENDUM C

FILENAME: P:\DWG OMEGA\0285 MISSION TRAIL BLDG\AUTOCAD\0285-C2-GRADING.DWG DATE: 2/13/2018 5:04:39 PM

CONSTRUCTION NOTES:

NO.	DESCRIPTION	DETAIL/STANDARD	SYMBOL
8	CAST-IN-PLACE INLET (SIZE PER PLAN)	SDD-114	
9	AREA DRAIN	D-6	
13	PCC HEADWALL (H=2.66', L=3.0')	D-30 (MODIFIED)	
14	RIP RAP (W/NO. 2 BACKING) DIMENSIONS PER PLAN	–	
22	UNDERGROUND SEWER HOLDING TANK	A	
23	WATER SERVICE BACKFLOW W/CAGED	SDW-155	
25	PERFORATED SUB-DRAIN	D-6	
27	FDC/PIV	A	
28	SEWER CLEANOUT	SDS-102	
29	CAST-IN-PLACE GRATED CONTROL STRUCTURE	D-29 & F-10	
30	PROTECTION POST BOLLARD	WM-04	
31	STORM DRAIN CLEANOUT	D-6	
32	POTABLE WATER TRENCH	SDW-110	
35	SEWER FLOOR DRAIN	D-6	
36	SHALLOW AREA DRAIN	D-6	
37	NORMALLY OPEN SOLENOID CONTROLLED SHUT OFF VALVE	–	–

THRUST BLOCK DATA TABLE

TB#	DESCRIPTION	TOTAL THRUST	REQUIRED BLOCK AREA
1	6"-45°-BEND	7,155 LBS	7.2 SF
2	6"-90°-BEND	13,221 LBS	13.2 SF
3	8"X8"X6"-TEE	9,349 LBS	9.3 SF

PER WATER AGENCY STANDARDS, SECTION 5.2 – AWWA C900, CLASS 305 PVC PIPE (SEE SDW-151 FOR REFERENCE)
SOIL BEARING CAPACITY = 1,500 LB/SF
FACTOR OF SAFETY = 1.5

STORM DRAIN DATA TABLE

X	BEARING	DISTANCE	DESCRIPTION
1	N 80°00'00" W	35.10'	8" PVC @ 0.75%
2	N 80°00'00" W	33.30'	8" PVC @ 0.75%
3	N 10°00'00" E	67.00'	8" PVC @ 1.0%
4	N 80°00'00" W	65.72'	8" PVC @ 1.0%
5	N 07°04'44" E	38.52'	8" PVC @ 1.0%
6	N 80°00'00" E	16.47'	8" PVC @ 1.0%
7	N 27°47'53" W	61.70'	8" PVC @ 2.0%
8	N 80°00'00" W	17.78'	8" PVC @ 1.0%
9	N 80°00'00" W	17.78'	8" PVC @ 1.0%
10	N 31°52'46" W	14.83'	8" PVC @ 2.7%
11	N 80°00'00" W	17.78'	8" PVC @ 1.0%
12	N 80°00'00" W	17.78'	8" PVC @ 1.0%
13	N 61°19'03" E	62.73'	8" PVC @ 0.5%
14	N 79°56'07" W	82.56'	8" PERF DRAIN @ 0.5%
15	N 85°22'13" W	17.16'	8" PERF DRAIN @ 0.5%
16	N 68°42'01" W	37.96'	8" PERF DRAIN @ 0.5%
17	N 77°10'05" E	37.52'	8" PERF DRAIN @ 0.5%
18	N 09°39'04" W	25.82'	8" PERF DRAIN @ 0.5%
19	N 76°28'23" E	29.86'	8" PERF DRAIN @ 0.5%
20	N 10°00'00" E	41.07'	8" PERF DRAIN @ 0.5%
21	N 87°41'34" W	49.79'	8" PERF DRAIN @ 0.5%
22	N 87°41'34" W	26.66'	8" PERF DRAIN @ 0.5%

SEWER DATA TABLE

X	BEARING	DISTANCE	DESCRIPTION
1	N 10°03'50" E	9.11'	6" PVC @ 2.0%
2	N 79°56'10" W	56.96'	6" PVC @ 2.0%
3	N 10°03'50" E	23.59'	6" PVC @ 2.0%
4	N 79°56'10" W	6.35'	6" PVC @ 2.0%

WATER DATA TABLE

X	BEARING	DISTANCE	DESCRIPTION
1	N 16°52'15" W	17.78'	6" PVC C900 CL.305
2	N 73°07'45" E	45.08'	6" PVC C900 CL.305
3	N 62°00'00" W	74.25'	6" PVC C900 CL.305
4	N 62°00'00" W	78.51'	2" PVC C900 CL.305

NOTE:
– 36" MINIMUM COVER FOR FIRE SERVICE
– 24" MINIMUM COVER FOR DOMESTIC SERVICE

C-3

PLANS FOR THE CONSTRUCTION OF
MISSION TRAILS FIELD STATION EAST FORTUNA

UTILITY PLAN

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING AND CAPITAL PROJECTS DEPARTMENT
SHEET 7 OF 123 SHEETS

WBS S-14016

ISSUE FOR: _____ 9/12/2017
FOR CITY ENGINEER DATE

SUBMITTED BY: JORGE ACEVEDO, PROJECT MANAGER
CHECKED BY: MARLON PEREZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
100% C.D.	OEC			
PERMIT SET	OEC			
A ADDENDUM C			2/13/18	

246-1761 CCS27 COORDINATE
1889-6321 CCS83 COORDINATE
39038- 7 -D

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN THE DRAWING IS NOT TO SCALE

The City of SAN DIEGO Public Works

OMEGA ENGINEERING CONSULTANTS
4340 VIEWRIDGE AVE, SUITE B
SAN DIEGO, CALIFORNIA 92123
Phone: (858) 634-8620

REGISTERED PROFESSIONAL ENGINEER ANDREW J. GILLAM No. 45940 Exp. 9-30-19 CIVIL STATE OF CALIFORNIA

A SUB-DRAIN ADDITION

ADDENDUM C

DIGALERT CALL 8-1-1

DATE: 2/13/2018 5:08:01 PM
FILENAME: P:\DWG OMEGA\0285 MISSION TRAIL BLDG\AUTOCAD\0285-C3-UTILITY.DWG

(X) CONSTRUCTION NOTES:

NO.	DESCRIPTION	DETAIL/STANDARD	SYMBOL
(4)	ADA COMPLIANT OPEN-GRID PAVERS	1/SDG-129	
(6)	PCC PAVEMENT MEDIUM BROOM (PARKING)*	(6"PCC/6"AB)	
(7)	AC PAVEMENT*	(4"AC/10"AB)	
(12)	BIORETENTION AREA	4/SDG-132	
(16)	DECOMPOSED GRANITE PATHWAY (STABILIZED)	PER LANDSCAPE	
(33)	PCC SIDEWALK	SDG-155	
(34)	PCC PAVEMENT MEDIUM BROOM (VEHICULAR)*	(6"PCC/7"AB)	

* FINAL PAVEMENT SECTION PER GEOTECHNICAL CONSULTANT BASED ON FIELD-TESTED R-VALUE

(X) CONTROL POINT DATA TABLE

NO.	NORTHING	EASTING	DESCRIPTION
1	1889037.99	6321904.33	BUILDING CORNER
2	1889062.43	6321767.83	BUILDING CORNER
3	1889106.61	6321793.41	CURB ANGLE POINT
4	1889087.92	6321897.75	CURB ANGLE POINT
5	1889085.29	6321915.24	TRASH ENCLOSURE CORNER
6	1889081.77	6321934.91	TRASH ENCLOSURE CORNER

BENCHMARK

DESCRIPTION: BRASS PLUG IN TOP OF INLET
LOCATION: SOUTHEAST CORNER OF MAST BLVD & WEST HILLS PKWY
ELEVATION: 379.80 FEET (MSL)
SOURCE: CITY OF SAN DIEGO VERTICAL CONTROL AS SHOWN ON 31804-13-D

OVER-EXCAVATION NOTES

ALL SOIL WITHIN 3 FEET OF THE DEEPEST PLANNED FOOTING BOTTOM LEVEL SHOULD BE EXCAVATED AND REPLACED WITH COMPACTED FILL WITH AN EXPANSION INDEX OF 20 OR LESS. EXCAVATIONS SHOULD EXTEND AT LEAST 5 FEET OUTSIDE THE PLANNED FOOTING PERIMETER.

INTERIOR SLABS-ON-GRADE

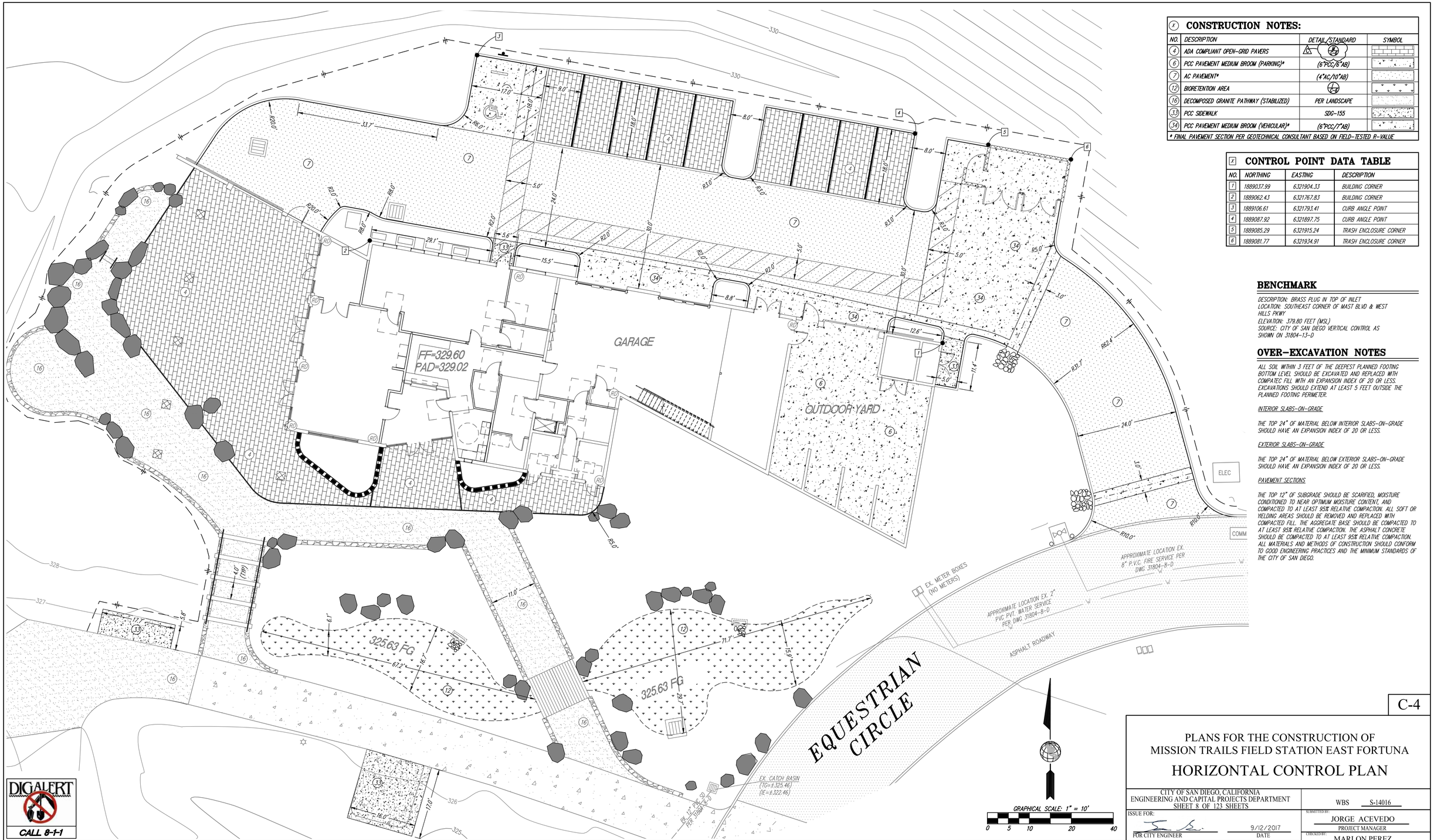
THE TOP 24" OF MATERIAL BELOW INTERIOR SLABS-ON-GRADE SHOULD HAVE AN EXPANSION INDEX OF 20 OR LESS.

EXTERIOR SLABS-ON-GRADE

THE TOP 24" OF MATERIAL BELOW EXTERIOR SLABS-ON-GRADE SHOULD HAVE AN EXPANSION INDEX OF 20 OR LESS.

PAVEMENT SECTIONS

THE TOP 12" OF SUBGRADE SHOULD BE SCARIFIED, MOISTURE CONDITIONED TO NEAR OPTIMUM MOISTURE CONTENT, AND COMPACTED TO AT LEAST 95% RELATIVE COMPACTION. ALL SOFT OR YIELDING AREAS SHOULD BE REMOVED AND REPLACED WITH COMPACTED FILL. THE AGGREGATE BASE SHOULD BE COMPACTED TO AT LEAST 95% RELATIVE COMPACTION. THE ASPHALT CONCRETE SHOULD BE COMPACTED TO AT LEAST 95% RELATIVE COMPACTION. ALL MATERIALS AND METHODS OF CONSTRUCTION SHOULD CONFORM TO GOOD ENGINEERING PRACTICES AND THE MINIMUM STANDARDS OF THE CITY OF SAN DIEGO.



DIG ALERT
CALL 8-1-1

C-4

PLANS FOR THE CONSTRUCTION OF
MISSION TRAILS FIELD STATION EAST FORTUNA

HORIZONTAL CONTROL PLAN

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING AND CAPITAL PROJECTS DEPARTMENT
SHEET 8 OF 123 SHEETS

WBS S-14016

ISSUE FOR:
FOR CITY ENGINEER — DATE 9/12/2017

SUBMITTED BY: JORGE ACEVEDO, PROJECT MANAGER
CHECKED BY: MARLON PEREZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
100% C.D.	OEC			
PERMIT SET	OEC			
A ADDENDUM C			2/13/18	

246-1761 CCS27 COORDINATE
1889-6321 CCS83 COORDINATE
39038- 8 -D

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

CONSTRUCTION CHANGE / ADDENDUM			
CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING
0 1/2 1
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The City of SAN DIEGO Public Works

OMEGA ENGINEERING CONSULTANTS
4340 VIEWRIDGE AVE, SUITE B
SAN DIEGO, CALIFORNIA 92123
Phone: (858) 634-8620

REGISTERED PROFESSIONAL ENGINEER — ANDREW J. KILLIAN — No. 45940 Exp. 9-30-19 — CIVIL — STATE OF CALIFORNIA

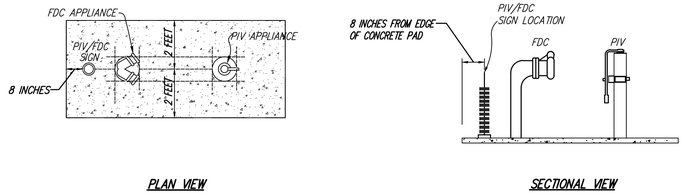
A DETAIL ADJUSTMENT

ADDENDUM C

DATE: 2/13/2018 5:16:07 PM
FILENAME: P:\DWG OMEGA\0285 MISSION TRAIL BLDG\AUTOCAD\0285-C4-HC.DWG

NOTES:

1. MEASUREMENTS MUST BE EXACT AND WILL BE SUBJECT TO A FIELD INSPECTION.
2. FIRE DEPARTMENT APPLIANCES SHALL BE NO CLOSER THAN 3 FEET TO THE FACE OF THE CURB.
3. CONCRETE PAD MUST BE A MINIMUM OF 4 INCHES THICK.
4. A BLUE REFLECTIVE MARKER MUST BE IN PLACE TO IDENTIFY PIV/FDC LOCATION.



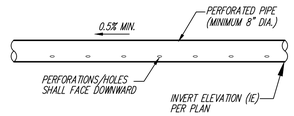
PLAN VIEW

SECTIONAL VIEW

FDC/PIV DETAIL

NOT TO SCALE

(A)



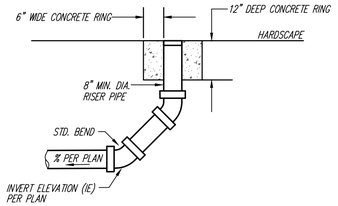
PERFORATED SUB-DRAIN

NOT TO SCALE

(B)

NOTES:

1. USE FLUSH FIT FLAT BRASS CAP FOR CLEANOUT IN THE HARDSCAPE. CONTRACTOR SHALL SUBMIT FOR APPROVAL PRIOR TO INSTALLATION.
2. CONCRETE RING SHALL BE 560-C-3250.
3. BEDDING PER SDD-110



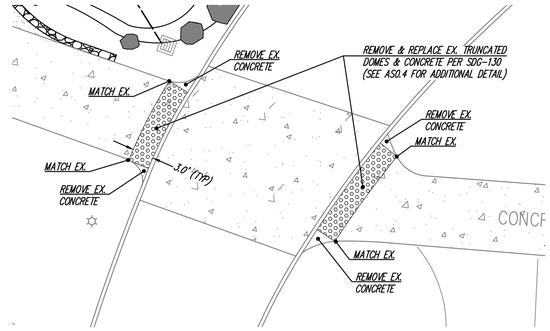
STORM DRAIN CLEANOUT DETAIL

NOT TO SCALE

(C)

NOTES:

1. PROTECT EXISTING 0" CURB IN PLACE
2. REMOVE EXISTING CONCRETE TO 3.0' MINIMUM BEHIND 0" CURB



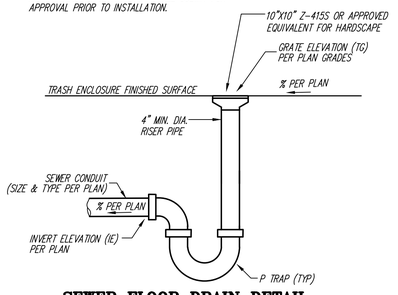
TRUNCATED DOMES REPLACEMENT DETAIL

SCALE 1"=10'

(H)

NOTES:

1. USE FLUSH FIT FLAT BRASS CAP FOR CLEANOUT IN THE HARDSCAPE. CONTRACTOR SHALL SUBMIT FOR APPROVAL PRIOR TO INSTALLATION.



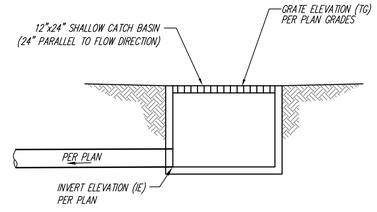
SEWER FLOOR DRAIN DETAIL

NOT TO SCALE

(D)

NOTES:

1. ADJUST ALL AREA DRAINS TO FINAL FINISH GRADES.
2. DIMENSION GIVEN FOR THE AREA DRAIN TO FINISH SURFACE SHALL MEAN DIMENSION FROM FINAL GRADE POST-LANDSCAPING.
3. CONTRACTOR SHALL SUBMIT GRATE TYPES FOR APPROVAL PRIOR TO INSTALLATION.



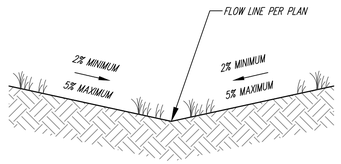
SHALLOW STORM DRAIN DETAIL

NOT TO SCALE

(E)

NOTES:

1. 1.0% MINIMUM IN DIRECTION OF SWALE



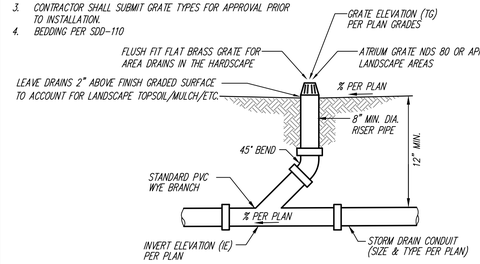
VEGETATED SWALE DETAIL

NOT TO SCALE

(F)

NOTES:

1. ADJUST ALL AREA DRAINS TO FINAL FINISH GRADES.
2. DIMENSION GIVEN FOR THE AREA DRAIN TO FINISH SURFACE SHALL MEAN DIMENSION FROM FINAL GRADE POST-LANDSCAPING.
3. CONTRACTOR SHALL SUBMIT GRATE TYPES FOR APPROVAL PRIOR TO INSTALLATION.
4. BEDDING PER SDD-110



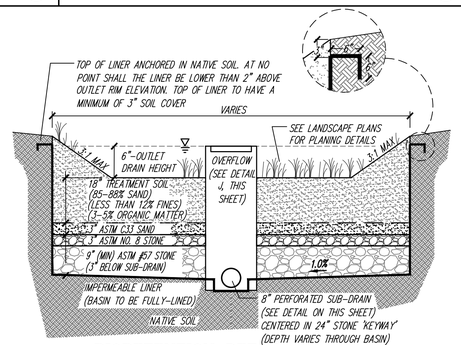
STORM DRAIN AREA DRAIN DETAIL

NOT TO SCALE

(G)

NOTES:

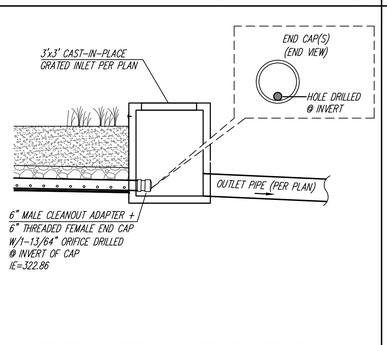
1. THE BIORETENTION FOOTPRINT AND MATERIALS QUANTITIES SHALL BE BASED ON THE GIVEN BASIN AREA PROVIDED ON THE PLAN.
2. PLANTING SOIL MAY UTILIZE NATIVE SOIL MIXED WITH CLEAN SAND SO LONG AS THE FINAL SIEVE ANALYSIS CONFIRMS THE SPEC REQUIREMENTS OR THE INFILTRATION RATE IS VERIFIED PRIOR TO SIGN-OFF. THE GEOTECHNICAL CONSULTANT OF RECORD SHALL PREFORM IN-SITU SIEVE ANALYSIS AND PERCOLATION TESTING AND PROVIDE A CONFIRMATION CERTIFICATION WITHIN THE FINAL AS GRADED SOILS REPORT UNLESS THE SOIL IS PROCURED FROM AN OFFSITE SOURCE WITH PRIOR APPROVAL CERTIFICATION STAMPED BY A LICENSED ENGINEER. CONTACT ENGINEER FOR APPROVAL PRIOR TO PLACEMENT OF SOIL
3. PLANTING SOIL MUST BE LOOSELY PLACED. DO NOT COMPACT OR DRIVE EQUIPMENT ACROSS PLANTING SOIL LAYER.
4. CONTRACTOR TO CONTACT ENGINEER FOR INSPECTION PRIOR TO PLACEMENT OF ROCK LAYER, AND PRIOR TO PLACEMENT OF TREATMENT SOIL LAYER.
5. WHEN POSSIBLE, IMPERMEABLE LINER SHALL BE FIXED WITH BATTEN STRIP AND RAMSET PINS TO ADJACENT PCC SIDEWALK OR PCC CURB. FOR FACILITIES THAT DO NOT ABUT SIDEWALKS, CURBS OR BUILDING FOOTINGS, LINER TO BE ANCHORED IN NATIVE SOIL AS SHOWN ON DETAILS.
6. LINER TO BE HIGH DENSITY POLYETHYLENE (HDPE), POLYVINYL CHLORIDE (PVC) OR ENGINEER APPROVED EQUIVALENT. LINER TO BE A MINIMUM OF 40 MILS THICK.
7. PROVIDE 24" WIDE KEYWAY FOR #57 STONE AND SUBDRAIN. DEPTH VARIES THROUGHOUT BASIN.



BIORETENTION DETAIL

NOT TO SCALE

(I)



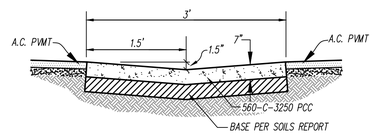
OUTLET CONTROL ORIFICE DETAIL

NOT TO SCALE

(J)

NOTES:

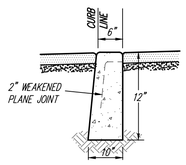
1. CONCRETE SHALL BE 560-C-3250.
2. WEAKENED PLANE JOINTS AT 15.0' O.C.
3. SUBGRADE SHALL BE COMPACTED TO 95% MIN. RELATIVE COMPACTION TO DEPTH OF 12".



RIBBON GUTTER DETAIL

NOT TO SCALE

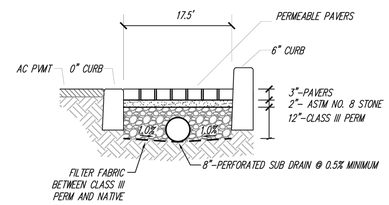
(K)



ZERO INCH CURB

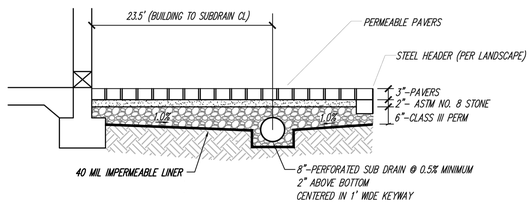
NOT TO SCALE

(L)



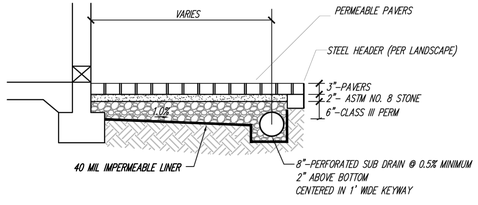
PERMEABLE PAVER SECTION DETAIL (PARKING)

NOT TO SCALE



PERMEABLE PAVER SECTION DETAIL (PEDESTRIAN - WEST)

NOT TO SCALE



PERMEABLE PAVER SECTION DETAIL (PEDESTRIAN - SOUTH)

NOT TO SCALE

(M)

DIGALERT CALL 8-1-1

CONSTRUCTION CHANGE / ADDENDUM			
CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING

0 1/2 1

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The City of SAN DIEGO Public Works

OMEGA ENGINEERING CONSULTANTS
4340 VIEWRIDGE AVE, SUITE B
SAN DIEGO, CALIFORNIA 92123
Phone: (858) 634-8620

REGISTERED PROFESSIONAL ENGINEER — Andrew J. Kaufman — No. 50940 Exp. 9-30-19 — CIVIL — STATE OF CALIFORNIA

C-6

PLANS FOR THE CONSTRUCTION OF
MISSION TRAILS FIELD STATION EAST FORTUNA

DETAILS

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING AND CAPITAL PROJECTS DEPARTMENT
SHEET 10 OF 123 SHEETS

WBS S-14016

ISSUE FOR:

FOR CITY ENGINEER — 9/12/2017 DATE

SUBMITTED BY: JORGE ACEVEDO, PROJECT MANAGER

CHECKED BY: MARLON PEREZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
100% C.D.	OEC			
PERMIT SET	OEC			
A ADDENDUM C			2/13/18	

246-1761 CCS27 COORDINATE

1889-6321 CCS83 COORDINATE

CONTRACTOR _____ DATE STARTED _____

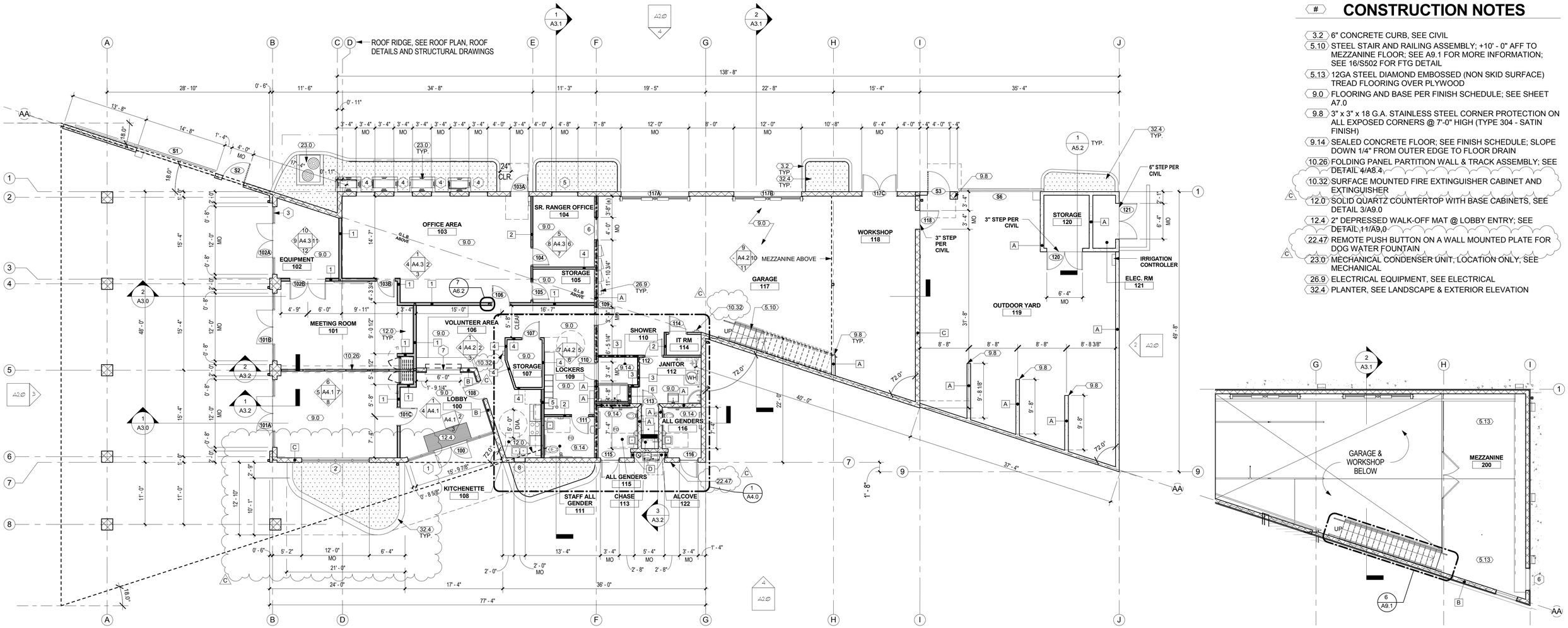
INSPECTOR _____ DATE COMPLETED _____

39038-10-D

A DETAIL ADDITION

ADDENDUM C

FILENAME: P:\DWG OMEGA\0285 MISSION TRAIL BLDG\AUTOCAD\0285-C6-DETAILS.DWG DATE: 2/13/2018 5:11:41 PM



CONSTRUCTION NOTES

- 3.2 6" CONCRETE CURB, SEE CIVIL
- 5.10 STEEL STAIR AND RAILING ASSEMBLY; +10' - 0" AFF TO MEZZANINE FLOOR; SEE A9.1 FOR MORE INFORMATION; SEE 16/S502 FOR FTG DETAIL
- 5.13 12GA STEEL DIAMOND EMBOSSED (NON SKID SURFACE) TREAD FLOORING OVER PLYWOOD
- 9.0 FLOORING AND BASE PER FINISH SCHEDULE; SEE SHEET A7.0
- 9.8 3" x 3" x 18 G.A. STAINLESS STEEL CORNER PROTECTION ON ALL EXPOSED CORNERS @ 7'-0" HIGH (TYPE 304 - SATIN FINISH)
- 9.14 SEALED CONCRETE FLOOR; SEE FINISH SCHEDULE; SLOPE DOWN 1/4" FROM OUTER EDGE TO FLOOR DRAIN
- 10.26 FOLDING PANEL PARTITION WALL & TRACK ASSEMBLY; SEE DETAIL 4/A8.4
- 10.32 SURFACE MOUNTED FIRE EXTINGUISHER CABINET AND EXTINGUISHER
- C 12.0 SOLID QUARTZ COUNTERTOP WITH BASE CABINETS, SEE DETAIL 3/A9.0
- 12.4 2" DEPRESSED WALK-OFF MAT @ LOBBY ENTRY; SEE DETAIL 11/A9.0
- 22.47 REMOTE PUSH BUTTON ON A WALL MOUNTED PLATE FOR DOG WATER FOUNTAIN
- C 23.0 MECHANICAL CONDENSER UNIT, LOCATION ONLY; SEE MECHANICAL
- 26.9 ELECTRICAL EQUIPMENT, SEE ELECTRICAL
- 32.4 PLANTER, SEE LANDSCAPE & EXTERIOR ELEVATION

FIRST FLOOR 2
1/8" = 1'-0"

MEZZANINE 1
1/8" = 1'-0"

WALL TYPES LEGEND

- A — INTERIOR 8" CMU WALL W/ PERCISION BLOCK (7'- 4" T.O. WALL @ OUTDOOR YARD; SEE 3/A3.4
- B — INTERIOR 8" CMU WALL W/ FLAGSTONE @ LOBBY SIDE; SEE 4/A3.4 SIM.
- C — EXTERIOR 8" CMU W/ FLAGSTONE ABOVE 10" CMU PORTION OF WALL - SEE DETAIL 2/A3.4
- D — EXTERIOR GLASS BLOCK WALL - SEE DETAIL 5/A3.4
- 1 — INTERIOR WALL, NON BEARING, FULL HT. TO UNDERSIDE OF STRUCTURAL, 2X6 WOOD STUD @ 16 O.C.; SEE DETAIL 6-A/A3.4
- 2 — INTERIOR WALL, NON BEARING, FULL HT. TO UNDERSIDE OF STRUCTURAL, 2X4 WOOD STUD @ 16 O.C.; SEE DETAIL 6-A/A3.4
- 3 — INTERIOR WALL, NON BEARING, FULL HT. TO UNDERSIDE OF STRUCTURAL, 2X4 WOOD STUD @ 16 O.C. STACKED ON 6" CONC. CURB; SEE DETAIL 6-A/A3.4
- 4 — INTERIOR WALL, NON BEARING, PARTIAL HT. 6" ABOVE CEILING, 2X4 WOOD STUD @ 16 O.C.; SEE DETAIL 6-B/A3.4
- 5 — INTERIOR PLUMBING WALL, NON BEARING, FULL HT. TO UNDERSIDE OF STRUCTURAL, 2X6 WOOD STUD @ 16 O.C. STACKED ON 6" CONC. CURB; SEE DETAIL 6-A/A3.4
- 7 — INTERIOR PLUMBING WALL, NON BEARING, FULL HT. TO UNDERSIDE OF STRUCTURAL, 2X6 WOOD STUD @ 16 O.C.; SEE DETAIL 6-A/A3.4

- (X) - WINDOW TYPE - SEE A6.0
- X - ROOM NUMBER SEE ROOM FINISH SCHEDULE - A7.0

GENERAL NOTE

1. PROVIDE TAMPER PROOF OUTLETS AT ALL PUBLIC AREAS INCLUDING EXTERIOR (INCLUDE UNDER CANOPY), LOBBY, MEETING ROOM & PUBLIC TOILETS.

C

0' 4' 8' 16' 32'
SCALE : 1'-0" = 1/8"

A1.1

AS-BUILT INFORMATION

MATERIALS	MANUFACTURER

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING
0 1/2 1
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The City of SAN DIEGO Public Works

CONSULTANT

DAVY ARCHITECTURE
SERVICE DISABLED VETERAN OWNED
1053 TENTH AVENUE
SAN DIEGO, CA 92102
PHONE 619.238.3811
FAX 619.238.0442
WWW.DAVYARCHITECTURE.COM

ARCHITECT · ERIC H. DAVY · #C14152 · REGISTERED: AUGUST 31, 20[illegible] · STATE OF CALIFORNIA

PLANS FOR THE CONSTRUCTION OF MISSION TRAILS FIELD STATION EAST FORTUNA

FIRST FLOOR PLAN

SPEC. NO. 1578

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 20 OF 123 SHEETS

APPROVED:
FOR CITY ENGINEER — DATE 9/12/2017
JASON GRANI — RCE# C77208
PRINT DCE NAME

DESCRIPTION	BY	APPROVED	DATE	FILMED
PERMIT SET			08/31/2017	
C ADDENDUM C			02/13/2018	

WBS S-14016

JORGE ACEVEDO — PROJECT MANAGER
MARLON PEREZ — PROJECT ENGINEER
246-1761
CCS27 COORDINATE
1889-6321
CCS83 COORDINATE

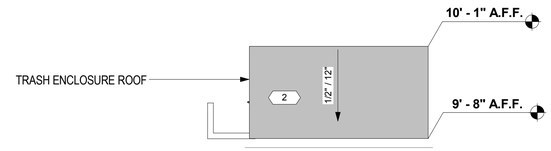
CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

39038 - 20 - D

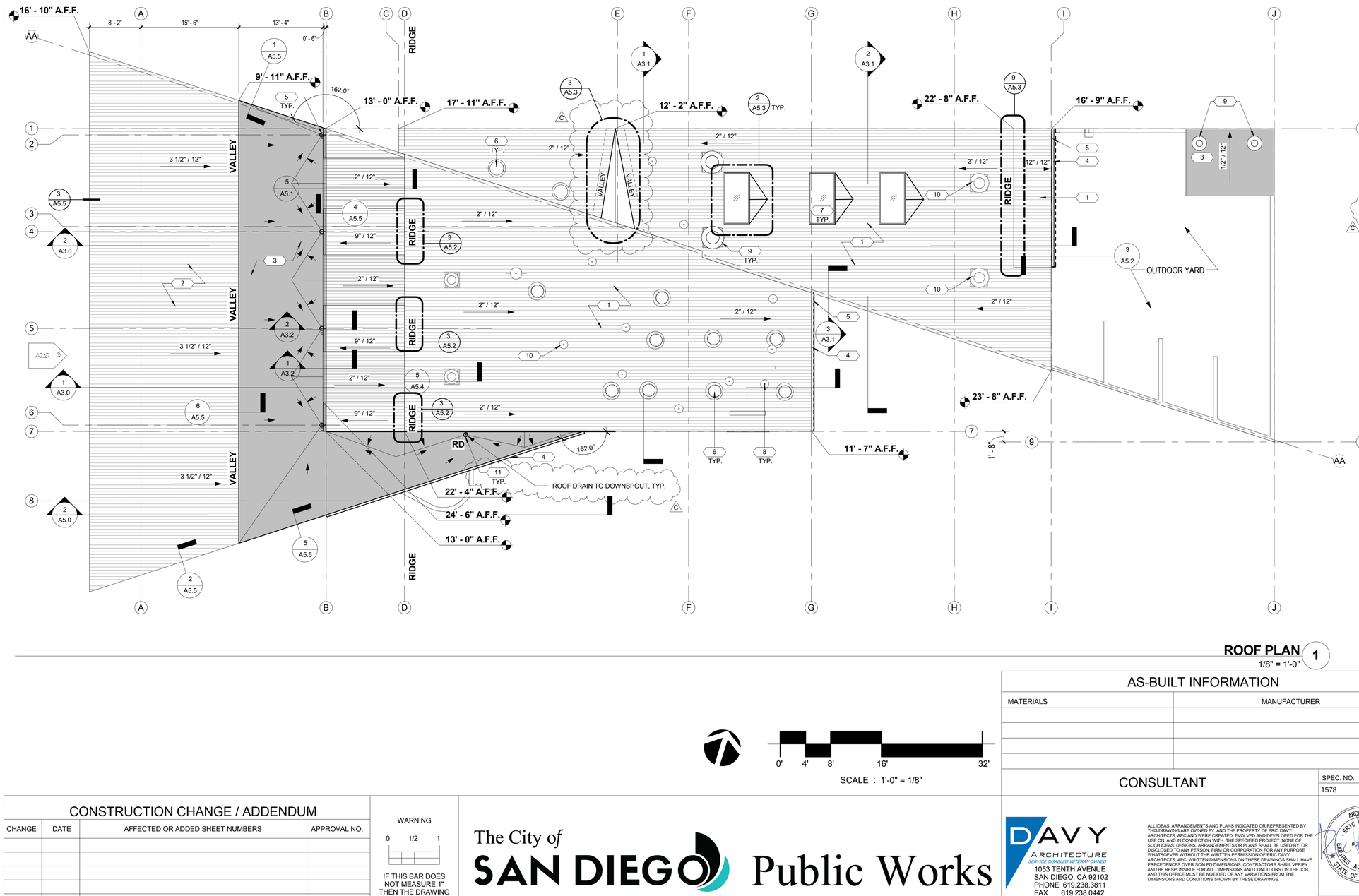
C PLANTER AREA / DOG FOUNTAIN CONTROL / FIRE EXTINGUISHER

ADDENDUM C

MISSION TRAILS FIELD STATION EAST FORTUNA



TRASH ENCLOSURE ROOF PLAN 2
1/8" = 1'-0"



ROOF PLAN 1
1/8" = 1'-0"

CONSTRUCTION NOTES

#	
1	STANDING SEAM METAL ROOF (TYPICAL ROOF ASSEMBLY)
2	STANDING SEAM METAL ROOF W/ 1-1/2" MTL DECK (SLOPING CANOPY ASSEMBLY)
3	SINGLE PLY T.P.A. ROOFING WITH TAPERED INSULATION
4	GUTTER
5	DOWNSPOUT
6	SOLATUBE (SEE DETAILS ON A-5.4)
7	SKYLIGHT WITH CRICKETS (SEE DETAILS ON A5.3)
8	8" EXHAUST DUCT (SEE MECHANICAL ROOF PLAN M2.1)
9	GRAVITY VENT (SEE MECHANICAL ROOF PLAN M2.1) SEE 5 / A5.4
10	EXHAUST DUCT (SEE MECHANICAL ROOF PLAN M2.1)
11	ROOF DRAIN PER NOTE 6 BELOW

GENERAL ROOF PLAN NOTES

1. ROOF GUTTERS SHALL BE PROVIDED WITH THE MEANS TO PREVENT THE ACCUMULATION OF LEAVES AND DEBRIS IN THE GUTTER. ALL ROOF GUTTERS AND DOWNSPOUTS SHALL BE CONSTRUCTED OF NON-COMBUSTIBLE MATERIALS (CBC 705A.4)
2. DRIP EDGE FLASHING USED AT THE FREE EDGES OF ROOFING MATERIALS SHALL BE NON-COMBUSTIBLE (CBC 705A.4.1)
3. VALLEY FLASHING SHALL BE NOT LESS THAN 0.019-INCH (NO. 26 GALVANIZED SHEET GAGE) CORROSION-RESISTANT METAL INSTALLED OVER A MINIMUM 36-INCH-WIDE UNDERLAYMENT CONSISTING OF ONE LAYER OF NO. 72 ASTM CAP SHEET RUNNING THE FULL LENGTH OF THE VALLEY (CBC 705A.3)
4. ALL VENT OPENINGS SHALL BE PROTECTED BY NON-COMBUSTIBLE, CORROSION RESISTANT MESH THAT MEET THE REQUIREMENTS OF CBC 706A.2 AND 706A.4
5. ALL FLASHING AND ROOF JACKS SHOULD BE MINIMUM 24 GAUGE GALVANIZED METAL, PER FACILITIES DIVISION STANDARDS AND SPECIFICATIONS GUIDELINE
6. ROOF DRAINS TO BE INSTALLED IN THE LOW SLOPE AREA OF THE ROOF CANOPY SHALL BE JR SMITH, MODEL 1010 SERIES WITH MANUFACTURER'S SHEET METAL SUMP, 3 INCH. PROVIDE A TRANSITION FROM THE OUTLET OF THE DRAIN BODY TO THE SHEET METAL DOWNSPOUT.

C

0' 4' 8' 16' 32'

SCALE : 1'-0" = 1/8"

A1.3

MISSION TRAILS FIELD STATION EAST FORTUNA

AS-BUILT INFORMATION

MATERIALS	MANUFACTURER

PLANS FOR THE CONSTRUCTION OF MISSION TRAILS FIELD STATION EAST FORTUNA

ROOF PLAN

CONSULTANT

DAVY ARCHITECTURE
SERVICE DISABLED VETERAN OWNED
1053 TENTH AVENUE
SAN DIEGO, CA 92102
PHONE 619.238.3811
FAX 619.238.0442
WWW.DAVYARCHITECTURE.COM

ERIC H. DAVY #C14152 REGISTERED ARCHITECT 31 AUGUST 2017 STATE OF CALIFORNIA

SPEC. NO. 1578

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 22 OF 123 SHEETS

APPROVED: _____ 9/12/2017
FOR CITY ENGINEER DATE
JASON GRANI C77208
PRINT DCE NAME RCE#

DESCRIPTION	BY	APPROVED	DATE	FILMED
PERMIT SET			08/31/2017	
C ADDENDUM C			02/13/2018	

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

C ROOF DRAINAGE DESCRIPTION

WBS S-14016

JORGE ACEVEDO
PROJECT MANAGER

MARLON PEREZ
PROJECT ENGINEER

246-1761
CCS27 COORDINATE
1889-6321
CCS83 COORDINATE

39038 - 22 - D

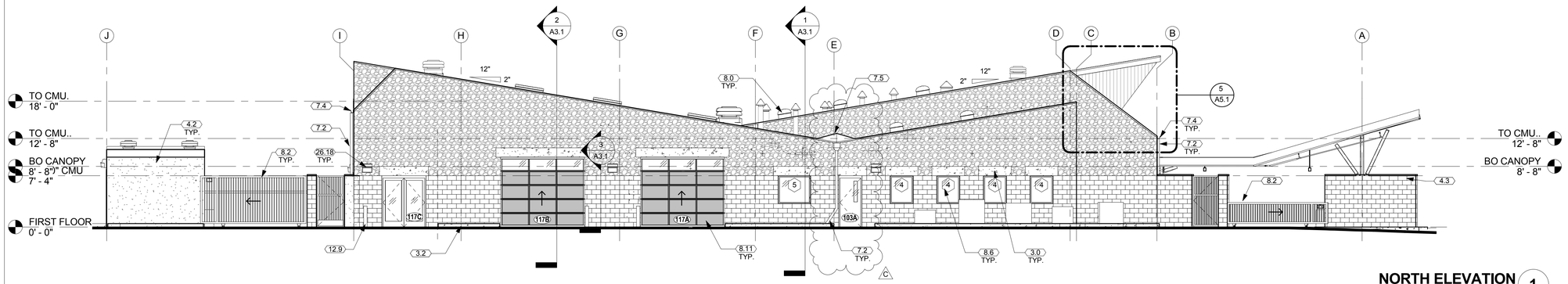
ADDENDUM C

CONSTRUCTION CHANGE / ADDENDUM

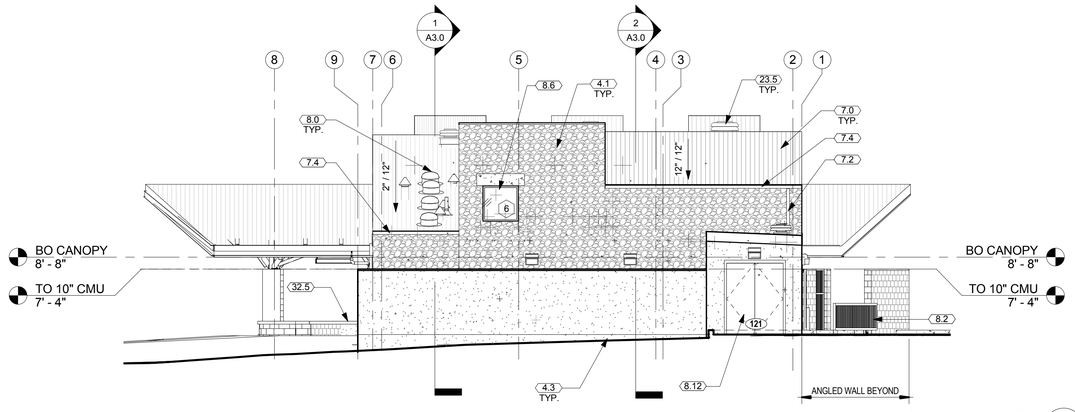
CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN THE DRAWING IS NOT TO SCALE

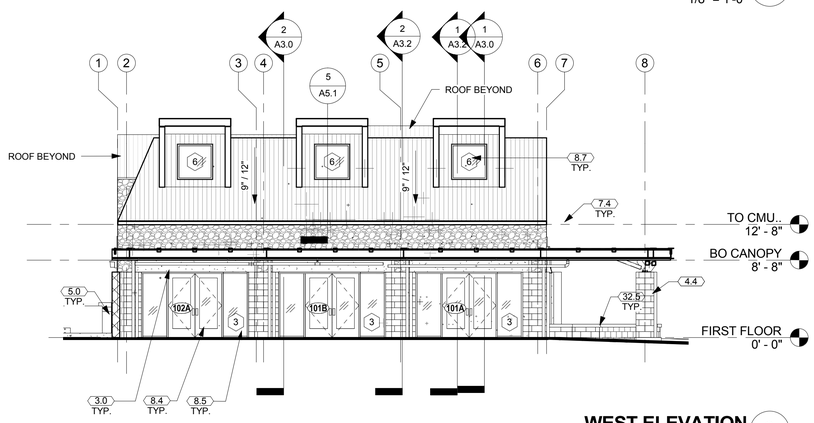
The City of SAN DIEGO Public Works



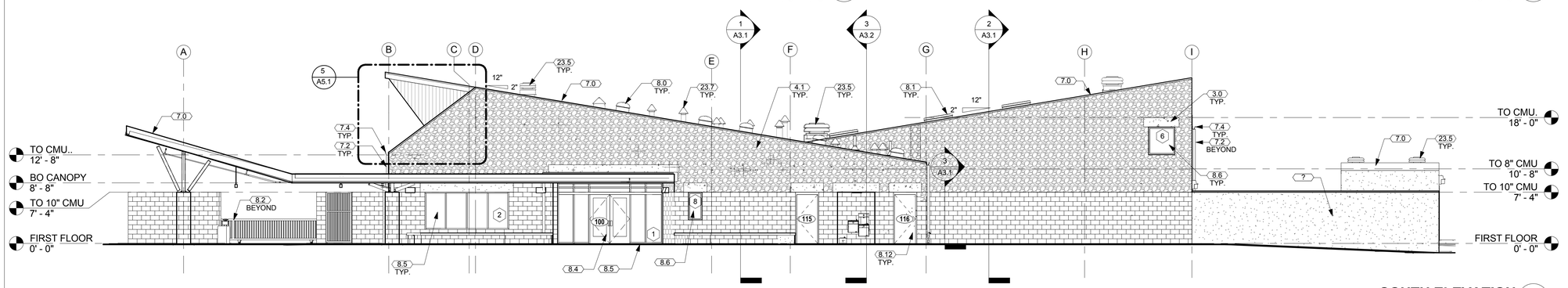
NORTH ELEVATION 1
1/8" = 1'-0"



EAST ELEVATION 2
1/8" = 1'-0"



WEST ELEVATION 3
1/8" = 1'-0"



SOUTH ELEVATION 4
1/8" = 1'-0"

CONSTRUCTION NOTES

3.0	CAST-IN-PLACE CONCRETE LINTEL; SEE DETAILS 1/A3.4, 13&14/S-802
3.2	6" CONCRETE CURB, SEE CIVIL
4.1	FLAGSTONE VENEER OVER 8" CMU, SEE DETAIL 4/A3.4
4.2	10" CMU BLOCK WALL; SEE DETAIL 3/A3.4 SIM.
4.3	8" CMU BLOCK WALL; SEE DETAIL 3/A3.4
4.4	8" CMU PIER COLUMN PER STRUCTURAL
5.0	STEEL COLUMN PER STRUCTURAL
7.0	STANDING SEAM METAL ROOFING, SEE ROOF DETAILS SHEETS A5.3 & A5.4
7.2	ROOF DOWNSPOUT LOCATION; SHALL BE PROTECTED BY LEAF SCREENS OR APPROVED EQUAL; SEE DETAIL XX/XX
7.4	ROOF GUTTER; SHALL BE PROTECTED BY LEAF SCREENS OR APPROVED EQUAL; SEE DETAIL XX/XX
7.5	SHEET METAL CRICKET; SEE DETAIL 3/A8.8 SIM.
8.0	SOLARTUBE; INSTALL PER MANUFACTURE; SEE DETAIL1/A5.4
8.1	4'X 8' UNIT SKYLIGHT, SEE DETAIL 2/A5.3 AND STRUCTURAL FOR FRAMING
8.2	AUTOMATIC SLIDING METAL GATE; INSTALL PER MANUFACTURE; SEE DOOR & GATE SCHEDULE
8.4	STOREFRONT DOUBLE DOOR; SEE DOOR & WINDOW SCHEDULE
8.5	STOREFRONT GLAZING, SEE WINDOW SCHEDULE
8.6	DUAL-GLAZED ALUMINUM WINDOWS, TEMPERED EXTERIOR GLAZING, SEE WINDOW SCHEDULE
8.7	DUAL-GLAZED ALUMINUM DORMER WINDOWS, TEMPERED EXTERIOR GLAZING, SEE WINDOW SCHEDULE
8.11	ALUMINMUM SECTIONAL GARAGE DOOR (CLOPAY COMMERICAL OR APPROVED EQUAL); INSTALL PER MANUFACTURE; SEE DOOR AND WINDOW SCHEDULE
8.12	HOLLOW METAL DOORS; SEE DOOR WINDOW SCHEDULE
12.9	6" DIAMETER BOLLARD; SEE DETAIL -/--
23.5	GRAVITY VENT, LOCATION ONLY, SEE MECHANICAL
23.7	EXHAUST DUCT, LOCATION ONLY; SEE MECHANICAL
26.18	EXTERIOR LIGHTING; SEE ELECTRICAL
32.5	RAISED CMU PLANTER SEAT WALL W/ RADIUS; SEE DETAIL 10/AS0.3

GENERAL NOTES

1. PROVIDE SHEET METAL DOWNSPOUTS PER SECTION 076200 TO COMPLY WITH SMACNA "ARCHITECTURAL SHEET METAL MANUAL". THE DOWNSPOUTS SHALL BE 2" x 3" X 26 GAGE WITH 3 COAT FLUOROPOLYMER FINISH PER 076200.2.B.4. THE DOWNSPOUT AT E 1 SHALL BE 3" x 4" RECTANGLE. DETAIL THE DOWNSPOUTS PER SMACNA FIGURE B, PROVIDE CONDUCTOR PER SMACNA PLATE 25, FIGURE F. THE DOWNSPOUTS SHALL ENTER THE STORM DRAINS IDENTIFIED ON SHEET C-3. PROVIDE A CAST-IRON HUB RECEIVER TO EXTEND 6 INCHES ABOVE THE FINISHED GRADE DOWN THE PVC PIPES SIMILAR TO DETAIL C/C-6.

C

SCALE : 1'-0" = 1/8"

AS-BUILT INFORMATION

MATERIALS	MANUFACTURER

PLANS FOR THE CONSTRUCTION OF MISSION TRAILS FIELD STATION EAST FORTUNA

EXTERIOR ELEVATIONS

A2.0

MISSION TRAILS FIELD STATION EAST FORTUNA

CONSULTANT

DAVY ARCHITECTURE
SERVICE DISABLED VETERAN OWNED
1053 TENTH AVENUE
SAN DIEGO, CA 92102
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FAX 619.238.0442
WWW.DAVYARCHITECTURE.COM

ERIC H. DAVY #C014152 REGISTERED ARCHITECT STATE OF CALIFORNIA EXPIRES AUGUST 31, 2019

SPEC. NO. 1578

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 23 OF 123 SHEETS

APPROVED: _____ DATE 9/12/2017
FOR CITY ENGINEER
JASON GRANI RCE# 67208
PRINT DCE NAME

DESCRIPTION	BY	APPROVED	DATE	FILMED
PERMIT SET			08/31/2017	
C ADDENDUM C			02/13/2018	

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

WBS S-14016

JORGE ACEVEDO	PROJECT MANAGER
MARLON PEREZ	PROJECT ENGINEER
246-1761	CCS27 COORDINATE
1889-6321	CCS83 COORDINATE
39038 - 23 - D	

C DOWNSPOUT DESCRIPTION

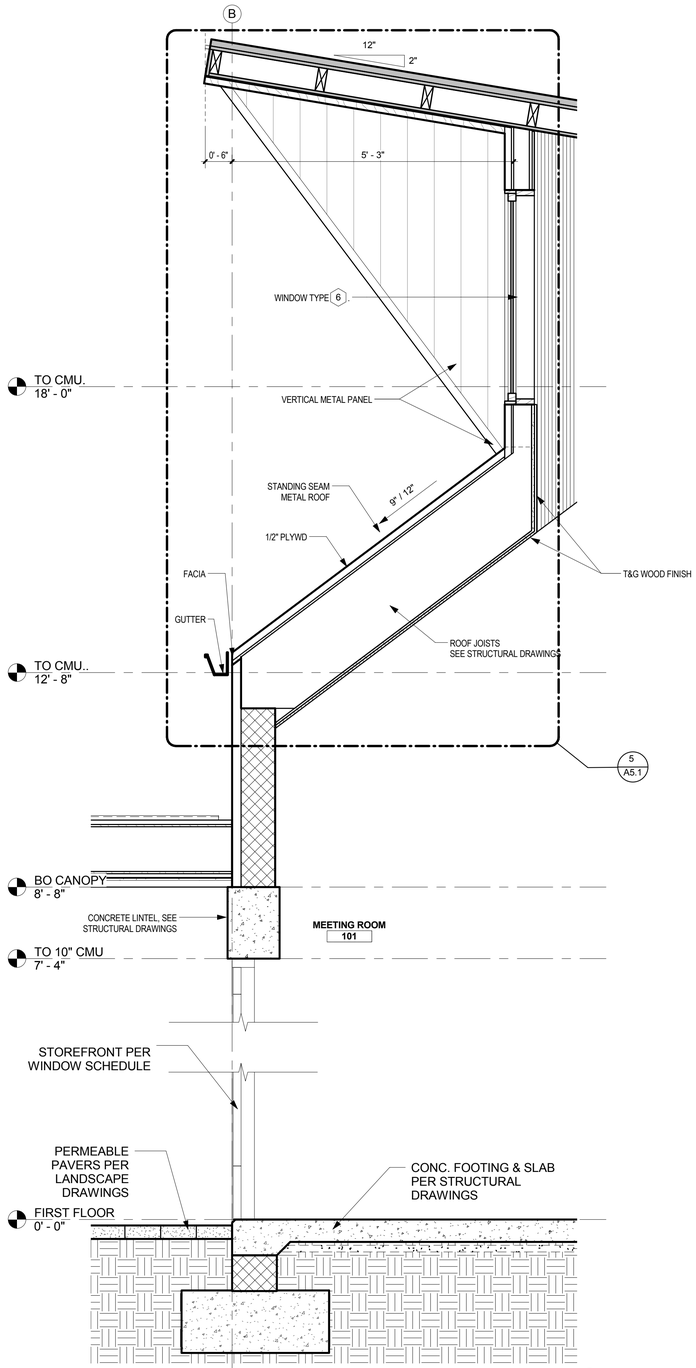
ADDENDUM C

CONSTRUCTION CHANGE / ADDENDUM

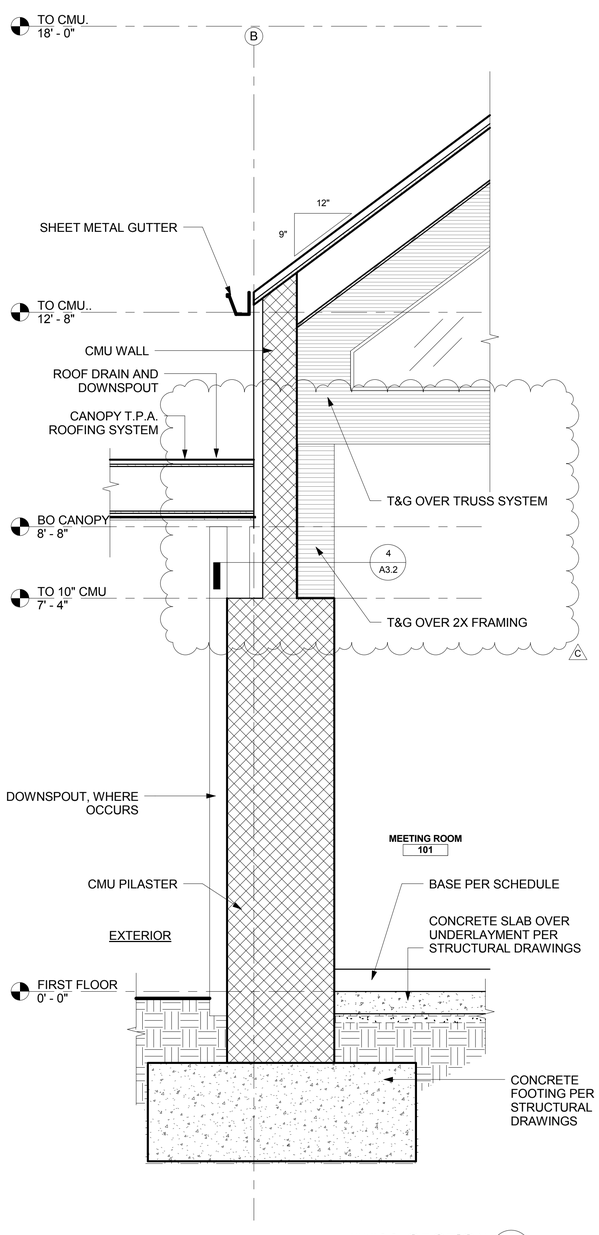
CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN THE DRAWING IS NOT TO SCALE

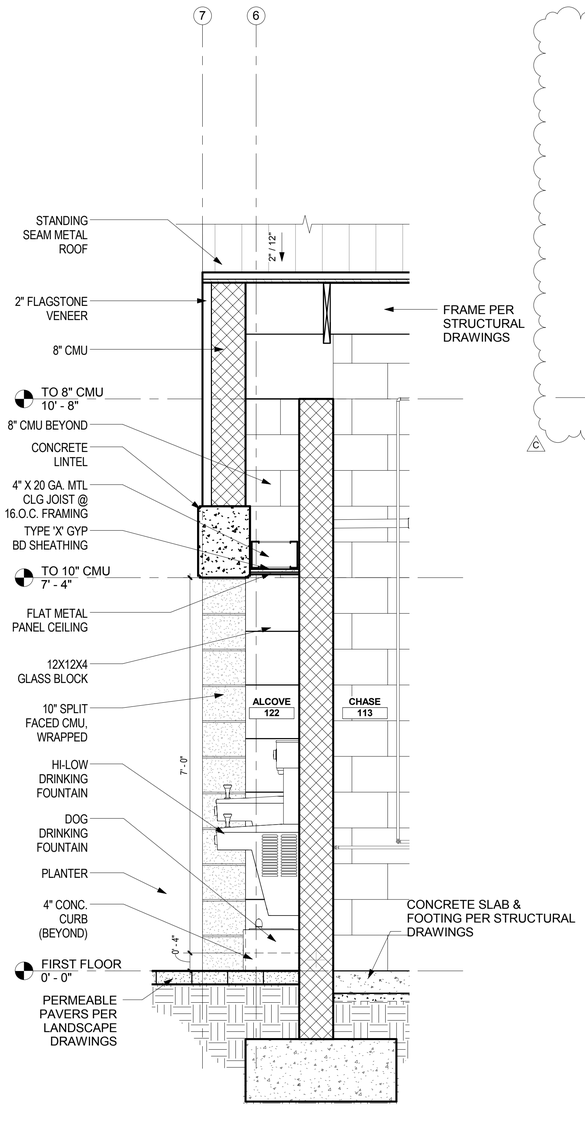
The City of SAN DIEGO Public Works



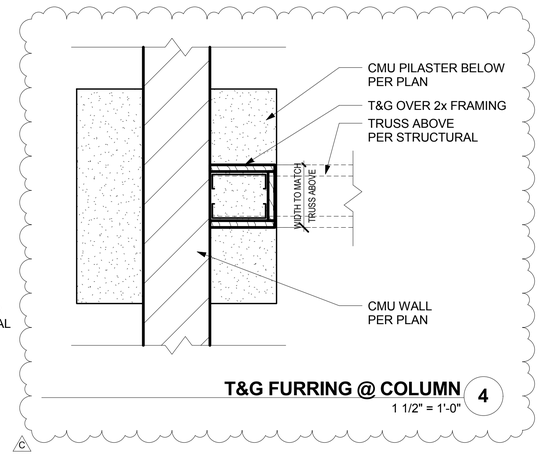
WALL SECTION 1
3/4" = 1'-0"



WALL SECTION 2
3/4" = 1'-0"



WALL SECTION 3
3/4" = 1'-0"



T&G FURRING @ COLUMN 4
1 1/2" = 1'-0"

A3.2

MISSION TRAILS FIELD STATION EAST FORTUNA

AS-BUILT INFORMATION

MATERIALS	MANUFACTURER

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING

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The City of SAN DIEGO Public Works

CONSULTANT

DAVY ARCHITECTURE
SERVICE DISABLED VETERAN OWNED
1053 TENTH AVENUE
SAN DIEGO, CA 92102
PHONE 619.238.3811
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SPEC. NO.
1578

ERIC H. DAVY #C14152 REGISTERED ARCHITECT STATE OF CALIFORNIA EXPIRES AUGUST 31, 2019

DESCRIPTION	BY	APPROVED	DATE	FILMED
PERMIT SET			08/31/2017	
C ADDENDUM C			02/13/2018	

CONTRACTOR _____ DATE STARTED _____

INSPECTOR _____ DATE COMPLETED _____

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 26 OF 123 SHEETS

APPROVED:
FOR CITY ENGINEER _____ DATE 9/12/2017
JASON GRANI C77208
PRINT DCE NAME RCE#

PLANS FOR THE CONSTRUCTION OF MISSION TRAILS FIELD STATION EAST FORTUNA

WALL SECTIONS

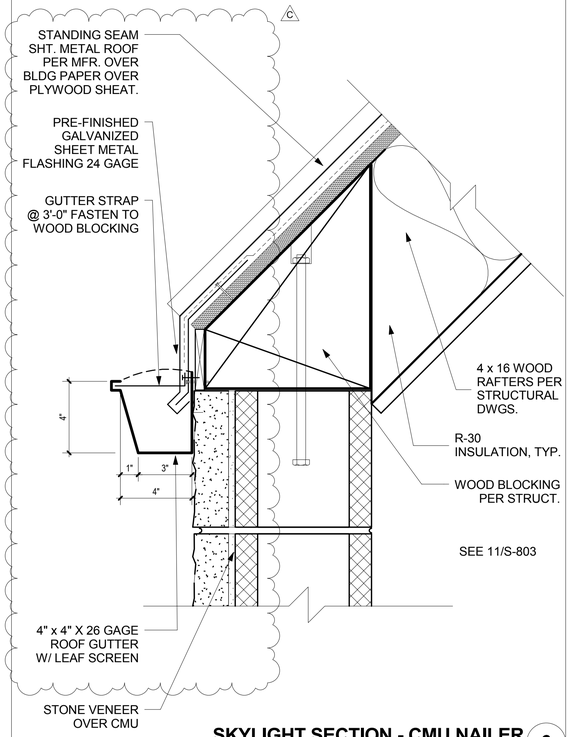
WBS S-14016

JORGE ACEVEDO	PROJECT MANAGER
MARLON PEREZ	PROJECT ENGINEER
246-1761	CCS27 COORDINATE
1889-6321	CCS83 COORDINATE

39038 - 26 - D

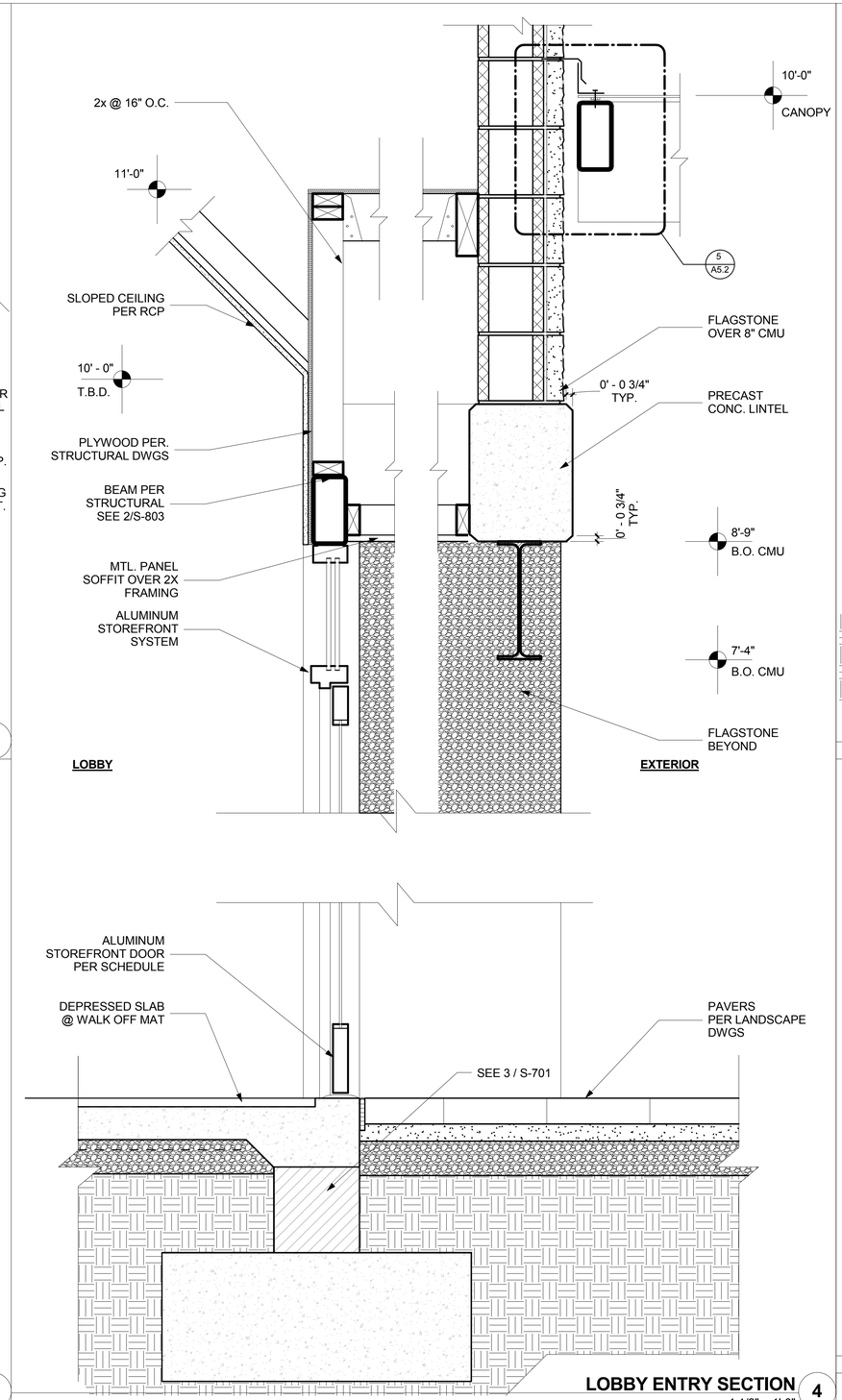
C TONGUE & GROOVE FURRING AT COLUMN

ADDENDUM C



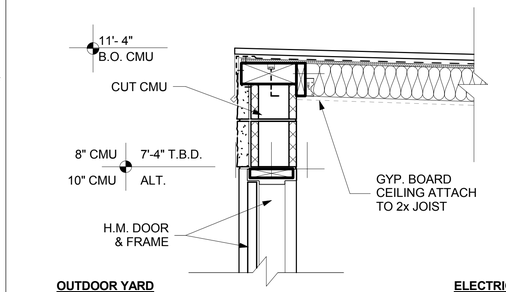
SKYLIGHT SECTION - CMU NAILER 6

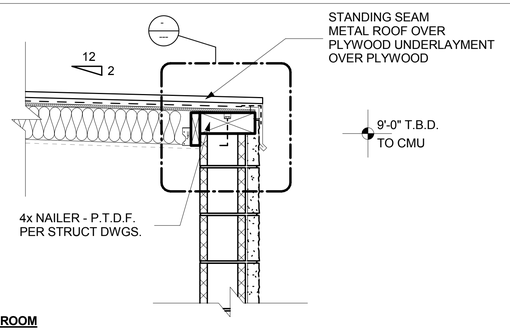
3" = 1'-0"

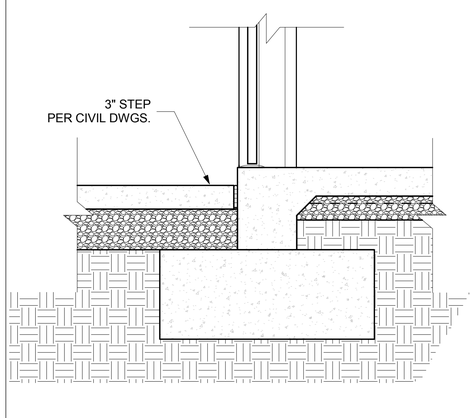


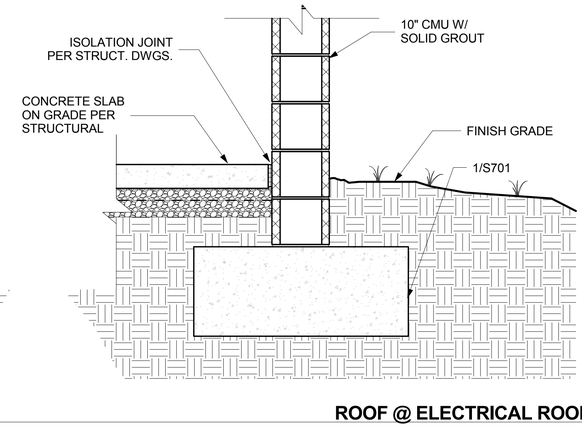
LOBBY ENTRY SECTION 4

1 1/2" = 1'-0"



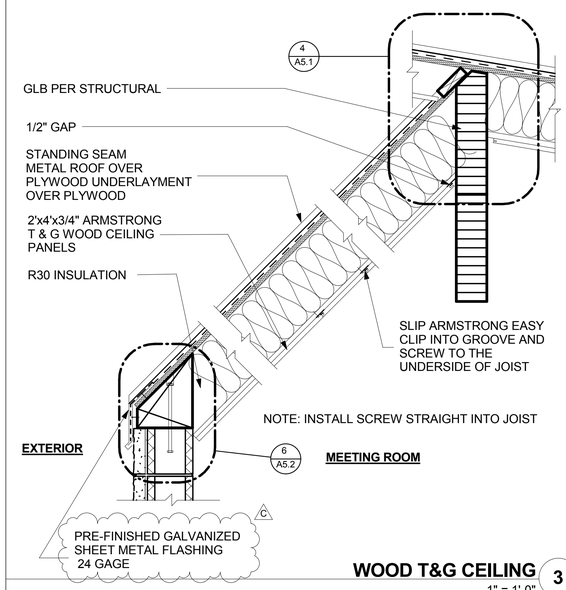






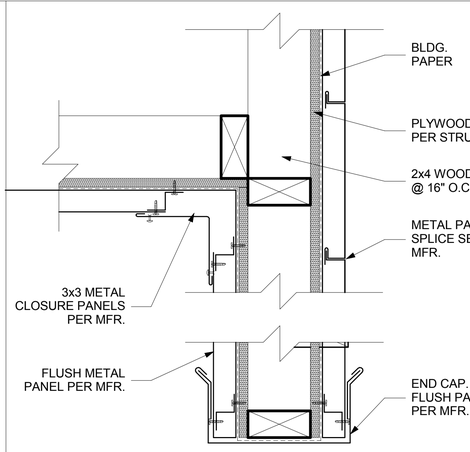
ROOF @ ELECTRICAL ROOM 1

1" = 1'-0"



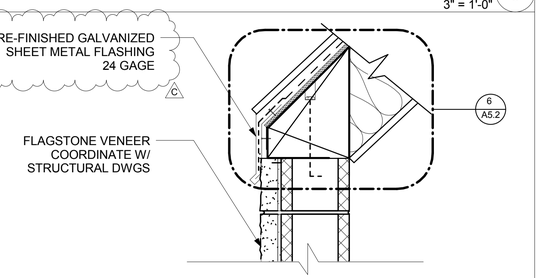
WOOD T&G CEILING 3

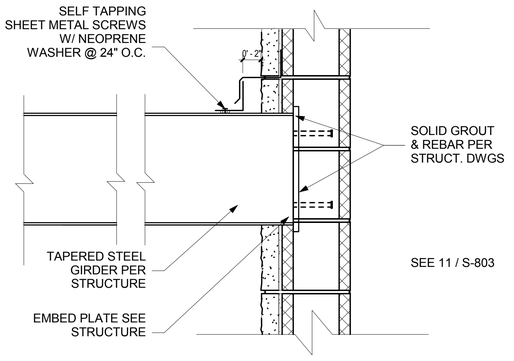
1" = 1'-0"



DORMER EXTERIOR WING WALL 2 A5.2

3" = 1'-0"





EXPANSION JOINT @ CANOPY & BUILDING 5

1 1/2" = 1'-0"

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING

0 1/2 1

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The City of SAN DIEGO Public Works

CONSULTANT

DAVY ARCHITECTURE
SERVICE DISABLED VETERAN OWNED
1053 TENTH AVENUE
SAN DIEGO, CA 92102
PHONE 619.238.3811
FAX 619.238.0442
WWW.DAVYARCHITECTURE.COM

SPEC. NO. 1578

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 35 OF 123 SHEETS

APPROVED: _____ DATE 9/12/2017
FOR CITY ENGINEER
JASON GRANI RCE# C77208
PRINT DCE NAME

ERIC H. DAVY #C31415 REGISTERED ARCHITECT STATE OF CALIFORNIA AUGUST 31, 2019

DESCRIPTION	BY	APPROVED	DATE	FILMED
PERMIT SET			08/31/2017	
C ADDENDUM C			02/13/2018	

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

C ROOF GUTTER DIMENSIONS & FINISH

WBS S-14016

JORGE ACEVEDO
PROJECT MANAGER

MARLON PEREZ
PROJECT ENGINEER

246-1761
CCS27 COORDINATE

1889-6321
CCS83 COORDINATE

39038 - 35 - D

MISSION TRAILS FIELD STATION EAST FORTUNA

PLANS FOR THE CONSTRUCTION OF MISSION TRAILS FIELD STATION EAST FORTUNA

ROOF DETAILS

ADDENDUM C

City of San Diego

CITY CONTACT: Brittany Friedenreich, **Contract Specialist, Email**: BFriedenreic@sandiego.gov
Phone No. (619) 533-3104

ADDENDUM D

e - Bidding

FOR

MISSION TRAILS FIELD STATION EAST FORTUNA

BID NO.:	**K-18-1578-DBB-3**
SAP NO. (WBS/IO/CC):	**S-14016**
CLIENT DEPARTMENT:	**1714**
COUNCIL DISTRICT:	**7**
PROJECT TYPE:	**BH**

BID DUE DATE:

2:00 PM
MARCH 16, 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 — 03/06/2018 (Date) — Seal:

2) For City Engineer — 03/06/2018 (Date) — Seal:

A. CHANGES TO CONTRACT DOCUMENTS

The following changes to the Contract Documents are hereby made effective as though originally issued with the bid package. Bidders are reminded that all previous requirements to this solicitation remain in full force and effect.

THE SUBMITTAL DATE FOR THIS PROJECT HAS BEEN **EXTENDED AS STATED ON THE COVER PAGE.**

B. BIDDER's QUESTIONS

Q1. Construction Note 32.4 "Planter, see landscape & exterior elevation" and L1.1 Hardscape Legend #11A Planter Wall description per Architect. Please provide a planter wall detail.

A1. 10/AS0.3

Q2. Detail 2/A3.4 calls for 10" split face CMU below stone veneer, detail 2/A3.3 calls for 10" thickened face cell CMU per structural drawings below stone veneer. The structural drawings call the CMU out as "conc. Block wall per plan". What type of CMU block are contractors responsible for?

A2. 10" Split face CMU up to 7' – 4", 8" precision block behind stone veneer.

Q3. Please provide a signage schedule as referred to on sheet A9.3.

A3. Final sign wording will be provided a shop drawing review. Otherwise see Sheet A9.3 with the construction room names on the plan.

Q4. Wood products are called out to be FSC lumber. This is not a LEED project, please confirm FSC lumber is not needed for this project.

A4. This is not a LEED project but the Forest Stewardship requirements apply.

Q5. 1/AS0.5 Pedestrian Bridge states "Conc. Footing per Struct. Dwgs" as well as for the Concrete Planks however, no detail can be found in the structural drawings for this item. Please provide.

A5. Use the structural information provided on Detail 1/AS0.5.

Q6. 12/AS0.3 New Concrete To Soil Detail calls out 10x10 wire mesh. Please confirm that is referring to the gauge and not the spacing and should be 6x6 10G WWM? Also shown on this detail reference to San Diego Standard Drawing SDG-155 & 156 that has no reinforcing or thickened edge. Please confirm that the sidewalk is 4" thick without reinforcing and a thickened edge?

A6. Provide the thickened edge as detailed. No reinforcing required.

Q7. The Hardscape Legend shown on L1.1 shows Vehicular Concrete Paving with natural grey, medium broom finish. However, it does not show anything for the sidewalk color or finish. Is the sidewalk also natural grey with medium broom finish?

A7. Yes.

Q8. G2.1 Note 4 R&R existing concrete slab for ADA compliance, please provide the required color and finish.

A8. Natural grey to match existing.

Q9. The reflected ceiling plan does not match the finish schedule on A7.0. Which should we use.

A9. Provide ceiling materials as shown on RCP, Sections and details.

Q10. There is no spec for the pavers. Please provide.

A10. Square edge 4" x 8" x 3" nom. Color to be selected from manufacturer's standard range.

Q11. AS01 item #3 is called out as concrete and is located in front of the trash area all the way across the drive lane.

L1.0 the Hardscape plan has this area as Asphalt.

C-4 the Horizontal Control plan has this area as Concrete.

Please clarify is it concrete or asphalt.

A11. Provide concrete per the Civil Drawings.

Q12. Door 102A is shown as HM door & frame in Spec, shown as aluminum in door schedule. Please clarify door material.

A12. Provide aluminum to match adjacent doors 101A & B.

Q13. Door 102B is shown as HM door & frame on Spec and Door schedule but has a conflicting note that describes the door as wood, "SC". Please confirm if door is hollow metal or wood.

A13. Door 102B to be SC wood door in Hollow metal frame. Also at Door 111 delete the word "Timely" and substitute for "Hollow Metal".

Q14. Door 103A indicates HW group 09 on Spec and Plan, Door schedule is indicating the door has a Panic Device but HW group 09 does not include an exit device. – Please confirm if door requires exit device, if so, which one.

A14. No Panic required. Provide hardware per the hardware schedule.

Q15. Door 103A Door schedule is has "SC" indicating door is wood, but spec and plan show HM. – Door is quoted as HM. Please confirm if door is hollow metal or wood.

A15. Provide HM Door type F.

Q16. Door 108 is shown as type door E = flush no glass – plan is also showing a glass type GL-1 – Is door flush or does it require a vision lite?

A16. Provide SC wood Door type F.

Q17. Door 109 is indicating a 90-minute fire rating per spec, door schedule is indicating GL-1, Solarban 60, this glass is not fire rated. Is door 90 minute? If fire rated, can we price out a fire rated clear glass or is some form of Low-E required?

A17. Omit the Glass from this door.

James Nagelvoort, Director
Public Works Department

Dated: *March 6, 2018*
San Diego, California

JN/RWB/mlw

City of San Diego

CITY CONTACT: Brittany Friedenreich, **Contract Specialist, Email**: BFriedenreic@sandiego.gov
Phone No. (619) 533-3104

ADDENDUM E

e - Bidding

FOR

MISSION TRAILS FIELD STATION EAST FORTUNA

BID NO.:	**K-18-1578-DBB-3**
SAP NO. (WBS/IO/CC):	**S-14016**
CLIENT DEPARTMENT:	**1714**
COUNCIL DISTRICT:	**7**
PROJECT TYPE:	**BH**

BID DUE DATE:

2:00 PM
MARCH 23, 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 Engineer/Architect:

1) Registered Architect — 3/12/18 (Date) — Seal:

2) For City Engineer — 3/12/2018 (Date) — Seal:

A. CHANGES TO CONTRACT DOCUMENTS

The following changes to the Contract Documents are hereby made effective as though originally issued with the bid package. Bidders are reminded that all previous requirements to this solicitation remain in full force and effect.

THE SUBMITTAL DATE FOR THIS PROJECT HAS BEEN **EXTENDED AS STATED ON THE COVER PAGE.**

B. BIDDER's QUESTIONS

Q1. 12/AS0.3 New Concrete To Soil Detail calls out 10x10 wire mesh. Please confirm that is referring to the gauge and not the spacing and should be 6x6 10G WWM? Also shown on this detail reference to San Diego Standard Drawing SDG-155 & 156 that has no reinforcing or thickened edge. Please confirm that the sidewalk is 4" thick without reinforcing and a thickened edge?

A1. Provide the thickened edge as detailed in 12/AS0.3. No 6" x 6" 10/10 WWF.

Q2. Addendum D question #9 is asking about material for the ceilings and the answer is use the RCP, Sections and details. The problem is:

A1.2 calls for T&G

A3.0, item 9.4 calls for Tongue and Groove wood ceilings see 7/A8.0

A8.0 calls for 1x6 T&G wood panels

A3.2 calls for T&G

A5.2 detail 3 calls for 2' x 4' x ¾" Armstrong T&G wood ceiling panels.

A7.0 (Finish Schedule) has "TG" as Tongue & Grove-Wood – To Be Stained.

A2. Sheet A1.2 illustrates where T&G stained wood. Gypsum Board Painted, 2"x 2" lay-in and exposed structure where occur.

Details 5, 6, 7 & 8 / A8.0 refer to the T&G wood in the Lobby Ceiling, a special case.

The Armstrong T&G ceiling is another special case per Detail 3 / A5.2.

All of the various T&G applications are to be stained to match the existing at the Visitor's Center.

Q3. The Addendum C drawing G1.0 states the WPCP is subject to Municipal Storm Water Permit and there is a BMP drawing (C-9, C-10). C-9 states Post-Construction BMPS are required see sheet C-10.
C-10 does not show any BMP's.

Please clarify the City has created the WPCP and permits.

Please clarify what BMP's need to be implemented for this project.

A3. Development and implementation of the WPCP is responsibility of the contractor. Post-Construction BMPs are required per C-10.

Q4. Two (2) places on the plans call for 12 gauge steel diamond embossed (non-skid surface) tread flooring:

a. 5.13/A3.0 calls for it over plywood;

b. Finish Schedule Note 5/A7.0 calls for the same but over 20 ga. Corrugated steel deck. Per the structural drawings, there is no steel deck but there is ½ plywood over joists. Room 200 Mezzanine says MTL on the Schedule.

A4. Disregard the reference to corrugated steel deck where it might apply to the mezzanine. It is Diamond plate over plywood per structural.

Q5. We find no Specification for this material or installation procedures.

A5. Diamond plate may be adhesive applied to the plywood.

Q6. There is no F6 spread footing size in the footing schedule. Sheet S-101A shows some F6 spread footings. Please provide footing size.

A6. Footing is to be 8' x 8' x 2' deep.

James Nagelvoort, Director
Public Works Department

Dated: *March 13, 2018*
San Diego, California

JN/RWB/mlw

City of San Diego

CITY CONTACT: Brittany Friedenreich, **Contract Specialist, Email**: BFriedenreic@sandiego.gov
Phone No. (619) 533-3104

ADDENDUM F

e - Bidding

FOR

MISSION TRAILS FIELD STATION EAST FORTUNA

BID NO.: **K-18-1578-DBB-3**
SAP NO. (WBS/IO/CC): **S-14016**
CLIENT DEPARTMENT: **1714**
COUNCIL DISTRICT: **7**
PROJECT TYPE: **BH**

CITY OF SAN DIEGO
PUBLIC WORKS CONTRACTS
525 B STREET, SUITE 750, MS 908A
SAN DIEGO, CA 92101

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.

THE BID OPENING FOR THIS PROJECT HAS BEEN **POSTPONED UNTIL FURTHER NOTICE.**

James Nagelvoort, Director
Public Works Department

Dated: *March 16, 2018*
San Diego, California

JN / RWB / cc

City of San Diego

CITY CONTACT: Brittany Friedenreich, **Contract Specialist, Email**: BFriedenreic@sandiego.gov
Phone No. (619) 533-3104

ADDENDUM G

e - Bidding

FOR

MISSION TRAILS FIELD STATION EAST FORTUNA

BID NO.:	**K-18-1578-DBB-3**
SAP NO. (WBS/IO/CC):	**S-14016**
CLIENT DEPARTMENT:	**1714**
COUNCIL DISTRICT:	**7**
PROJECT TYPE:	**BH**

BID DUE DATE:

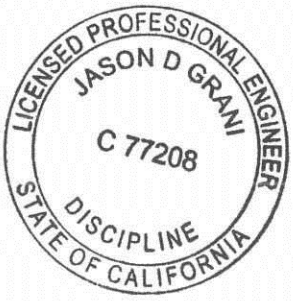
2:00 PM
APRIL 13, 2018
CITY OF SAN DIEGO
PUBLIC WORKS CONTRACTS
525 B STREET, SUITE 750, MS 908A
SAN DIEGO, CA 92101

ENGINEER OF WORK

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

1) Registered Architect — 3/27/2018 (Date) — Seal:

2) For City Engineer — 3/27/2018 (Date) — Seal:



A. CHANGES TO CONTRACT DOCUMENTS

The following changes to the Contract Documents are hereby made effective as though originally issued with the bid package. Bidders are reminded that all previous requirements to this solicitation remain in full force and effect.

THE SUBMITTAL DATE FOR THIS PROJECT HAS BEEN **EXTENDED AS STATED ON THE COVER PAGE.**

B. BIDDER's QUESTIONS

Q1. Sign schedule on sheet A9.3 is blank, please provide a revised sign schedule.

A1. See revised Sheet A9.3.

Q2. Please confirm that only structural steel fabricators are required to be AISC certified.

A2. AISC Certifications are required per Section 051200 of the Technical Specifications.

Q3. Regarding the roof flashing, F11 self-flashing is specified, but most metal roof manufacturers require a curb, and Solatube provides a curb cap counter-flashing.

Detail 39038-37-D/1 – 160 DS (10" Ø dome, tube and diffuser).

A3. See revised detail 1/A5.4.

Q4. Also noted is the tier drop decorative glass diffuser. Due to the weight, this May require additional support for the ACT ceilings. The classic Opt iView diffuser is recommended for better light distribution, less weight and less Cost.

A4. Provide supplemental 1 ½" cold rolled channels at Lay in ceilings as required.

Q5. In wildfire hazard zones, we recommend a ¼" tempered glass disc directly under the dome. This solution is not provided by the TDD manufacturer, but is provided by a subcontractor, and has been approved on many similar projects. On the detail, ¼" plexiglass is called out.

A5. Detail 1C/ A5.4 requires the layer of ¼" tempered glass.

Q6. Please clarify which size and model options are required.

A6. See revised detail 1/A5.4.

Q7. The specs call for an AISC Certified Plant. This is not a large structural steel building and with the current project this requirement will limit the amount of structural steel bids.

A7. AISC Certifications are required per Technical Specifications.

Q8. A3.0 and A4.1 show acoustical wall panels but do not provide any spec as to material, thickness, etc. Please provide what manufacturer, model, and specifications for these wall panels.

A8. See revised sheet A4.1.

Q9. Detail 13/A9.0 calls for 3 5/8" x 16GA steel studs @ 16" OC see wall types. The wall type schedule does not have any steel studs. Please clarify if this wall is really steel studs.

A9. Wall framing per wall type in A1.1.

Q10. Please provide details for manufacturer and type of walk-off mat. It is shown on the drawings but there is no information on the product.

A10. Provide Ronick Matting Systems poured abrasive insert Model No. G1PA19A005XXX.

Q11. The locker detail 13/A9.0 does not match the metal locker spec. Which is correct?

A11. Lockers per Technical Specifications.

Q12. Please provide a signage schedule as referred to on sheet A9.3.

A12. See revised Sheet A9.3.

Q13. Question 33 refers to the L11 type Light fixture but the answer refers to Lockers could you please clarify.

A13. See spec section 265100, as well as added cut-sheet. See attached Appendix J of this Addendum.

Q14. Please see the attached substitution request and spec section.

Roof plan (1/A1.3) the roof over Storage 120 & Elec. Room 121 has a keynote #3 which refers to a single ply roof system. However on 2/A1.1 the cut directs to detail 1/A5.2 which calls for a standing seam roof. What roofing system are contractors required to provide over the trash enclosure, single ply roof system or a standing seam roof system?

A14. See construction note 2/A1.3.

Q15. Please see the attached substitution request and spec section.

Trash Enclosure Foundation Plan shown on S-101B shows (2) F3 spread footings however, the footing schedule shown on 1/S-601 only shows F4 & F5 Footings. Please confirm the F3 footing 3'-0"x3'-0"x1'-10" w/ 3-#5 ew.

A15. F-3 footing to be 3'-0" x 3'-0" x 12" with (4) #4 bars each way.

Q16. A5.0 shows the canopy assembly with 5/8" gyp bd and linear metal ceilings. There are no details to how the gyp is attached and there are no details or spec on what this linear metal ceiling is.

A16. See revised sheet A5.0

Q17. A7.0 finish schedule does not show any metal ceilings, detail 2/A5.5 does not show any ceilings either.

Please clarify if there is metal ceilings and what the product is and how it is attached.

A17. The only sheet metal ceiling occurs at the drinking fountain alcove See detail 3/A3.2, use 3M 94CA adhesive.

Q18. The Addendum C answer to question #3 was "sign wording will be provided at Shop drawing review". To bid the project we don't need the wording, we need which of the signs go at each door!

We need to quantify each type of sign and to do that we need to know where each sign type is located.

A18. See revised Sheet A9.3.

Q19. Please complete the signage schedule or give us a count of each sign type.

A19. See revised sheet A9.3

Q20. What is the model number of the Armstrong Fine Fissured Tile?

A20. 2'-0" x 2'-0", Armstrong "Fine Fissured" lay in ceiling tiles

Q21. What type of acoustical wall panels are in the Meeting room and in Spec Book?

A21. Provide Lamvin (or approved equal) 5/8" thick fabric covered acoustical wall panels. Fabric to be selected from manufacturers full range. Provide manufacturer's standard wall attachment system. See 14/A9.0.

Q22. Please clarify the following regarding the checker plate flooring at the mezzanine:

1) Two (2) places on the plans call for 12 gauge steel diamond embossed (non-skid surface) tread flooring:

a. 5.13/A3.0 calls for it over plywood;

b. Finish Schedule Note 5/A7.0 calls for the same but over 20 ga. Corrugated steel deck. Per the structural drawings, there is no steel deck but there is ½ plywood over joists. Room 200 Mezzanine says MTL on the Schedule.

A22. See revised sheet A7.0

Q23. I have been trying to solicit more involvement from Structural Steel sub-contractors and the specs call for an AISC certified fabricator. Will the City accept City of LA certified Steel Fabricators?

A23. AISC Certifications are required per Section 051200 of the Technical Specifications.

Q24. A1.2 calls for MTL-1 at the canopy and A5.0 calls out Linear Metal ceiling over gypboard. The finish schedule calls out MTL as "Metal Corrugated Deck". There is no spec for MTL or MTL-1 or Linear Metal Ceilings.

A24. Structural Steel Note 10 on Sheet S-001 requires all exposed steel to be galvanized. This includes the metal deck. Add: exposed steel shall be galvanized, primed and painted. Color to match painted steel at existing Visitor Center.

Q25. The details on A5.5 do not show any gypboard or metal ceilings. There are no details on how the gypboard is attached to the metal deck and no framing shown to attach the gypboard and no details on how to attach the Metal Ceilings. Please clarify if there are metal ceilings and if so what they are and provide details on attachment, framing, etc.

A25. The only sheet metal ceiling occurs at the drinking fountain alcove See detail 3/A3.2.

Q26. Detail 1/A3.2 points out vertical metal panels but there are no specs as to what this product is. We must know a product to quantify and price correctly. Please provide information on these products.

A26. 6" wide Alucobond, Reynobond or approves equal flat section aluminum panels. Powder coat finish, color to be selected from manufacturer's full range.

Q27. Two of the companies listed in this specification are no longer in business: Integra and Water saver and Cooley Group does not even produce this product. I would like to be added to the list when you remove these two or three companies. Please let me know the information you require to be added to the list. I have attached our product specification for your review along with the updated FGI specification. Also, PGI is no longer PGI. The are FGI. https://www.fabricatedgeomembrane.com/.

2.03 PVC SHEET

A. PVC: Formulated from virgin PVC with plasticizers and other modifiers, compounded for use in hydraulic structures, and formed into uniform, flexible sheets with material properties complying with PGI's "Specification for PVC Geomembranes" for nominal thickness indicated.

1. Manufacturers:
   a. Cooley Group.
   b. Environmental Protection, Inc.
   c. Integra Plastics Inc.
   d. Lange Containment Systems, Inc.
   e. Melco Linings.
   f. Watersaver Company, Inc.
2. Nominal Thickness: 40 mil (minimum)
3. Sheet Texture: One side smooth; other side smooth.

A27. Contractor can use manufacturers b.,d.,e. listed above or approved equal

Q28. The detail of the work shop cabinets 3/A9.1 are not shown on the floor plan and really don't fit the space.

A28. Elevations referenced on plans govern. See cabinet details 1/A9.0, 2/A9.0 & 3/A9.0

See revised detail 3/A9.1

Q29. There are cabinets shown on the mezzanine detail 2/A3.1 you can kind of see them behind the guard rail but no details on them.

A29. Refer to cabinet details 1/A9.0, 2/A9.0 & 3/A9.0 for casework at mezzanine.

Q30. The reflected ceiling plan shows drywall lid in room 120 and 121, finish schedule shows exposed to roof.

A30. Ceiling to be Gypsum Board. Reflected ceiling plan 1/A1.2 and section 1/A5.2 govern.

Q31. There are a couple of ceilings that call out "DG" Desco Glazetite but there are no specifications on the product.

A31. Omit reference to Desco Glazetite.

Q32. The window in the SR. Rangers office is called out as type 6 with notes to be Aluminum, primed and painted frame. It also calls it to be a Dormer style and the sill to be 12'-6" AFF. Please clarify what this windows is and are all type 6 windows Dormer windows as shown on the finish schedule.

A32. See revised sheet A2.0 & A6.0.

C. ADDENDUM

1. To Addendum C, item B, BIDDER's QUESTIONS, page 3, Q12, A12, Q13, A13, Q19, A19, Q33, and A33, **DELETE** in their entirety and **SUBSTITUTE** with the following:

   Q12. Finish schedule shows a tongue and grove ceiling in 3 rooms. It does not provide species of wood. Please provide information on the wood ceiling including finish.

   A12. See revised sheet A7.0.

Q13. Wall section 2/A3.2 shows T&G over 2x framing at the 7'-4" height on the CMU wall but shows it as metal framing. Please clarify metal framing is correct in this location.

A13. Wall framing per wall type in A1.1.

Q19. Detail 1/AS0.5 shows precast plank and what looks like a metal plate and a weld symbol. It does not specify thickness of metal plate and any anchor or any detail. Please provide the details for this attachment.

A19. See revised detail 1/AS0.5.

Q33 Please provide a Sonneman part number for the L11 Type Fixture. The information shown on the Fixture Schedule is insufficient for bidding purposes.

A33. See spec section 265100, as well as added cut-sheet.

2. To Addendum C, item E, PLANS, to Drawing numbered 39038-1-D, **DELETE** in its entirety and **REPLACE** with page 12 of this Addendum.

3. To Addendum C, item E, PLANS, to Drawing numbered 39038-22-D, **DELETE** in its entirety and **REPLACE** with page 14 of this Addendum.

4. To Addendum C, item E, PLANS, to Drawing numbered 39038-23-D, **DELETE** in its entirety and **REPLACE** with page 15 of this Addendum.

5. To Addendum C, item E, PLANS, to Drawing numbered 39038-35-D, **DELETE** in its entirety and **REPLACE** with page 19 of this Addendum.

6. To Addendum D, item B, BIDDER's QUESTIONS, Q3, A3, Q9 and A9, **DELETE** in their entirety and **SUBSTITUTE** with the following:

Q3. Please provide a signage schedule as referred to on sheet A9.3.

A3. See revise Sheet A9.3.

Q9. The reflected ceiling plan does not match the finish schedule on A7.0. Which should we use.

A9. See revised sheet A7.0.

7. To Addendum E, item B, BIDDER's QUESTIONS, page 4, Q5 AND A5, **DELETE** in their entirety and **SUBSTITUTE** with the following:

   Q5. We find no Specification for this material or installation procedures.

   A5. Diamond plate may be adhesive applied to the plywood. See revised sheet A7.0.

D. SUPPLEMENTARY SPECIAL PROVISIONS

1. To Attachment E, **ADD** Appendix J, LED Pendant Cut Sheet, page 11 of this Addendum.

E. PLANS

1. To drawings numbered 39038-19-D, **DELETE** in its entirety and **REPLACE** with page 13 of this Addendum.

2. To drawings numbered 39038-30-D, 39038-32-D**,** 39038-33-D, **DELETE** in their entirety and **REPLACE** with pages 16 through 18 of this Addendum.

3. To drawings numbered 39038-37-D, 39038-39-D, 39038-42-D, and 39038-48-D, **DELETE** in their entirety and **REPLACE** with pages 20 through 23 of this Addendum.

4. To drawings numbered 39038-49-D, **DELETE** in its entirety and **REPLACE** with page 24 of this Addendum.

5. To drawings numbered 39038-51-D **DELETE** in its entirety and **REPLACE** with page 25 of this Addendum.

James Nagelvoort, Director
Public Works Department

Dated: *April 2, 2018*
San Diego, California

JN/RWB/mlw

Pi LED Pendant

By SONNEMAN Lighting

SONNEMAN Pi LED PENDANT 20"
"Or Approved Equal"

L11

LUMENS LIGHT AND LIVING
Call Us 877.445.4486

Product Options

Finish: Black Bronze, Bright Satin Aluminum, Textured White
Size: 16 Inch, 20 Inch

Details

- Designed by Robert Sonneman in 2015
- Material: Metal
- Shade Material: Acrylic
- 6' adjustable cable
- Dimmable with ELV/Triac/0-10V
- Dimmable when used with ELV or TRIAC dimmer dimmers(not included)
- ETL Listed
- Warranty: 1 Year
- Made In China

Dimensions

16 Inch Option Canopy: Diameter 5.5"
16 Inch Option Fixture: Height 2", Diameter 16"
16 Inch Option Maximum Hanging: Length Adjustable To 74"
20 Inch Option Canopy: Diameter 5.5"
20 Inch Option Fixture: Height 2", Diameter 20"
20 Inch Option Maximum Hanging: Length Adjustable To 74"

Notes:

Lighting

- 16 Inch Option: 30 Watt (2800 Lumens) 120 Volt/277 Volt Integrated LED: CRI: 90 Color Temp: 3000K
- 20 Inch Option: 50 Watt (4700 Lumens) 120 Volt/277 Volt Integrated LED: CRI: 90 Color Temp: 3000K

Additional Details

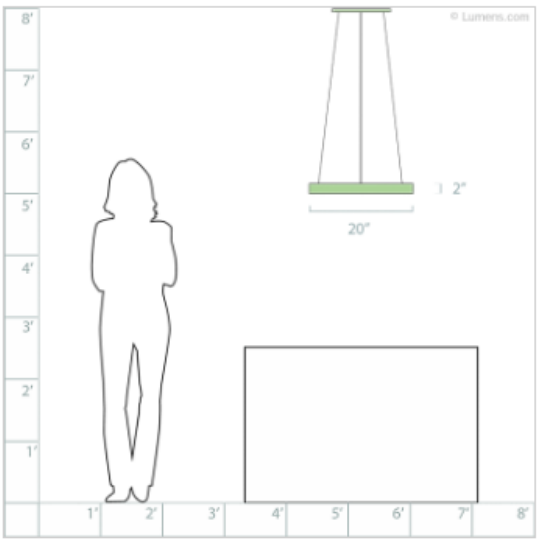
Product URL:
http://www.lumens.com/pi-led-pendant-by-sonneman-lighting-SNNP92409.html
Rating: ETL Listed

Product ID: SNNP92409

Prepared by:

Prepared for:
Project:
Room:
Placement:
Approval:

Created February 28th, 2017



20 Inch Option

MISSION TRAILS FIELD STATION EAST FORTUNA

14450 EQUESTRIAN CIRCLE, SAN DIEGO, CA 92071

CITY OF SAN DIEGO

CONTRACTOR'S RESPONSIBILITIES

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 A INJURY 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.V. 69 KV & HIGHER).

STORM WATER PROTECTION

1. TOTAL SITE DISTURBANCE AREA (ACRES) 0.78 ACRES
   HYDROLOGIC UNIT/ WATERSHED LOWER SAN DIEGO
   HYDROLOGIC SUBAREA NAME & NO. SANTEE & 907.12
2. THE CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS OF THE
   ☒ WPCP
   THE PROJECT IS SUBJECT TO MUNICIPAL STORM WATER PERMIT NO. R9-2013-0001 AS AMENDED BY R9-2015-0001 AND R9- 2015-0100
   ☐ SWPPP
   THE PROJECT IS SUBJECT TO MUNICIPAL STORM WATER PERMIT NO. R9-2013-0001 AS AMENDED BY R9-2015-0001 AND R9-2015-0100 AND CONSTRUCTION GENERAL PERMIT ORDER 2009-0009-DWQ AS AMENDED BY ORDER 2010-0014-DWQ AND 2012-0006-DWQ
   TRADITIONAL: RISK LEVEL [1] [2] [3]
   LUP- RISK TYPE [1] [2] [3]
3. CONSTRUCTION SITE PRIORITY
   ☐ ASBS ☐ HIGH ☐ MEDIUM ☒ LOW

FIRE NOTES

1. STRUCTURES IN THE COURSE OF CONSTRUCTION, ALTERATION OR DEMOLITION, INCLUDING THOSE IN UNDERGROUND LOCATIONS SHALL BE IN ACCORDANCE TO CFC CH. 33.
2. ADDRESS SHALL BE PROVIDED FOR ALL NEW AND EXISTING BUILDINGS IN A POSITION AS TO BE PLAINLY VISIBLE AND LEGIBLE FROM THE STREET OR ROAD FRONTING THE PROPERTY (CFC SEC. 505.1 FHPS POLICY P-00-6.
3. DECORATIVE MATERIALS SHALL BE MAINTAINED IN A FLAME RETARDANT CONDITION. (CAL CODE REGS., TIT. 19, SEC. 1173 & 1174, CFC SEC. 801.
4. AT LEAST ONE FIRE EXTINGUISHER WITH A MINIMUM RATING OF 2-A:20-B:C SHALL BE PROVIDED WITHIN 75' MAXIMUM TRAVEL DISTANCE FROM PUMPS, DISPENSERS OR STORAGE TANK FILL-PIPE OPENINGS. (CFC SEC. 2305.5, CAL. CODE REGS., TIT. 19, 3.29.)
5. COMPLETE PLANS AND SPECIFICATIONS FOR FIRE ALARM SYSTEMS; FIRE-EXTINGUISHING SYSTEMS, INCLUDING AUTOMATIC SPRINKLERS AND WET & DRY STANDPIPES; HALON SYSTEMS AND OTHER SPECIAL TYPES OF AUTOMATIC FIRE -EXTINGUISHING SYSTEMS; BASEMENT PIPE INLETS AND OTHER FIRE-PROTECTION SYSTEMS AND APPURTENANCES THERETO SHALL BE SUBMITTED TO FIRE AND HAZARD PREVENTION SERVICES FOR REVIEW AND APPROVAL PRIOR TO INSTALLATION. (CFC SEC. 901.2)
6. FIRE-EXTINGUISHING SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH CBC SEC. 906.9.1 THROUGH 906.9.3.
7. ALL VALVES CONTROLLING THE WATER SUPPLY FOR AUTOMATIC SPRINKLER SYSTEMS, PUMPS, TANKS, WATER LEVELS AND TEMPERATURES, CRITICAL AIR PRESSURES AND WATER FLOW SWITCHES ON ALL SPRINKLER SYSTEMS SHALL BE ELECTRICALLY SUPERVISED BY A LISTED FIRE ALARM CONTROL UNIT . (CBC SEC. 903.4)
8. FIRE ALARM SYSTEMS SHALL BE IN ACCORDANCE WITH CFC SEC. 907.
9. AT LEAST ONE FIRE EXTINGUISHER WITH A MINIMUM RATING OF 4-A:20-B:C SHALL BE PROVIDED OUTSIDE EACH MECHANICAL, ELECTRICAL, OR BOILER ROOM. (CFC SEC. 906.1, CAL. CODE REGS., TIT 19, SEC. 3.29)
10. FIRE PROTECTION, INCLUDING FIRE APPARATUS ACCESS ROADS AND WATER SUPPLIES FOR FIRE PROTECTION, SHALL BE INSTALLED AND MADE SERVICEABLE PRIOR TO AND DURING TIME OF CONSTRUCTION. (CFC SEC. 501.4 AND 503)
11. FIRE HYDRANTS SHALL COMPLY WITH FHPS POLICY F-96-01 FOR ON-SITE FIRE HYDRANTS.
12. FIRE HYDRANTS SYSTEMS SHALL COMPLY IN ACCORDANCE WITH CFC SEC. 507.1-507.5.6 AND APPENDIX C.
13. PROVIDE AN APPROVED KEY BOX IN AN APPROVED LOCATION (CFC SEC. 506.1, FHPS POLICY K-00-2)
14. EMERGENCY PLANS SHALL BE SUBMITTED TO FIRE AND HAZARD PREVENTION SERVICES FOR REVIEW AND APPROVAL PRIOR TO OCCUPANCY. (CFC SEC. 401, CAL. CODE REGS., TIT 19, SEC. 3.10)

DEFERRED SUBMITTAL REVIEW

FIRE SPRINKLER SYSTEM TO BE A DEFERRED SUBMITAL. SEE GENERAL NOTES: 63, 64, 65 & 66. ON SHEET G1.1

SYMBOL LEGEND

A / A301	SECTION NUMBER / SECTION NUMBER REFERENCE	1	WALL TYPE, SEE WALL TYPES LEGEND
1 / A501	DETAIL NUMBER / SECTION NUMBER REFERENCE	A	COLOR / FINISH REFERENCE
A / DA7.0B / C	INTERIOR ELEVATION REFERENCE		ILLUMINATED EXIT SIGN
A	GRID / COLUMN LINE REFERENCE	1	REVISION REFERENCE
101	ROOM REFERENCE		1 HOUR FIRE SEPARATION
101	DOOR REFERENCE, SEE DOOR SCHEDULE		NEW CONSTRUCTION
A	WINDOW REFERENCE, SEE WINDOW SCHEDULE		DIMENSION TO CENTER OF STUD OR FACE OF CMU
16.2	CONSTRUCTION NOTE		DIMENSION TO CENTERLINE OF OPENING
			DIMENSION TO ELEVATION AFF
			HIDDEN / PROJECTED LINE
			CEILING HEIGHT

RESPONSIBLE CHARGE

I HEREBY DECLARE THAT I AM THE ARCHITECT OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED REASONABLE CARE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME AS ARCHITECT OF ENGINEER OF WORK, OR MY RESPONSIBILITIES FOR PROJECT DESIGN.

SIGNATURE _____ 03/23/2018 DATE

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.
G	03/23/2018	G1.0, AS0.5, A1.3, A2.0, A4.1,A4.3, A5.0, A5.2, A5.4, A6.0, A7.0, A9.0	
		A9.1, A9.3	

PROJECT DATA

LEGAL DESCRIPTION: RANCHO MISSION FANTA RHO, RESUB CC348 (330)

PROJECT ADDRESS: 14450 EQUESTRIAN CIRCLE, SAN DIEGO, CA, 92071

ASSESSORS PARCEL NO: 366-071-2200

PROJECT NAME: MISSION TRAILS FIELD STATION EAST FORTUNA

PROJECT OWNER: CITY OF SAN DIEGO PUBLIC WORKS
525 B STREET, STE 750, SAN DIEGO, CA 92101
ATTENTION:JORGE ACEVEDO
ASSOCIATE ENGINEER, PROJECT MANAGER
EMAIL: ACEVEDOJ@SANDIEGO.GOV
PHONE:619-553-6657

MAP: MAP 1703

ALLOW. HEIGHT: 30' HIGH

CONST. TYPE: TYPE V-B, NON-RATED

SPRINKLED: YES

PROPOSED OCC.: B - BUSINESS; WITH ACCESSORY S-2 - COMMERCIAL STORAGE (< 500 SF) (NON-SEPARATED)

PRIOR DEVELOPMENT: CDP/SDP: 40-0524

AREA CALCULATIONS:

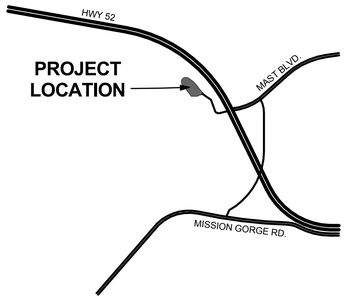
BUILDING AREA (FIRST FLOOR):	4,497 SF
BUILDING AREA (MEZZANINE):	444 SF
BUILDING AREA (YARD):	1,400 SF
BUILDING AREA (UNDER CANOPY):	3,068 SF
TOTAL AREA OF DISTURBANCE:	38,026 SF

FIRE ZONING

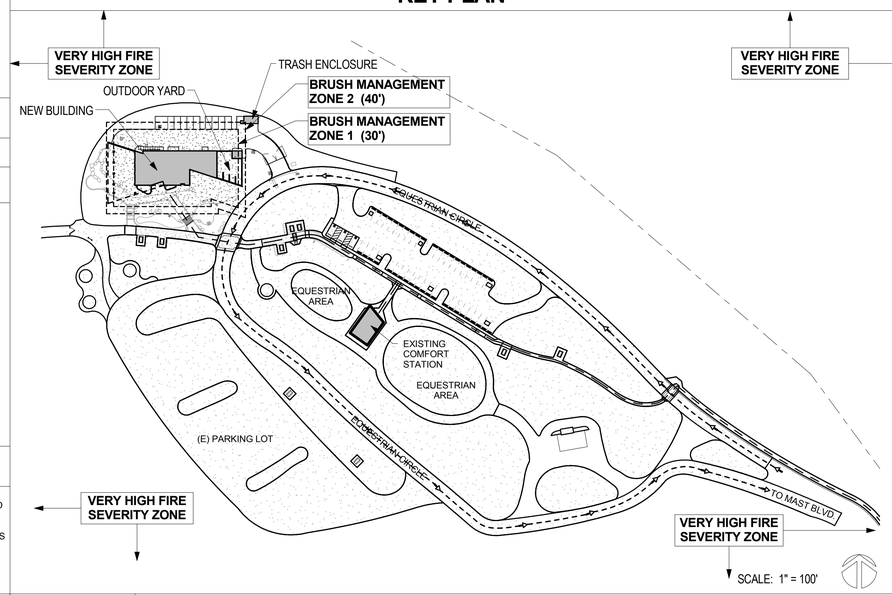
VERY HIGH FIRE SEVERITY ZONE
THE PROPOSED STRUCTURE IS ON A LOT THAT IS IN A VERY HIGH FIRE SEVERITY ZONE. THE MATERIALS AND METHODS OF CONSTRUCTION USED FOR THIS STRUCTURE, INCLUDING ATTACHED ACCESSORY STRUCTURES ARE IN ACCORDANCE WITH CHAPTER 7A, AS ADOPTED AND AMENDED BY THE CITY OF SAN DIEGO [SDMC 145.0701(b)]

BRUSH MANAGEMENT ZONES 1 & 2
THE PROPOSED STRUCTURE ISLOCATED IMMEDIATELY ADJACENT TO BRUSH MANAGEMENT ZONE ONE, AS DEFINED IN SDMC SECTION 142.0142. ALL VENTILATION IS DESIGNED TO BE DIRECTED AWAY FROM THE ADNE. [CBC 706A.4(b)] ALL EXTERIOR GLAZING USED IN SKYLIGHTS, ROOFS AND SLOPED WALLS SHALL BE TEMPERED GLASS. [CBC 711A.2]

VICINITY MAP



KEY PLAN



WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN THE DRAWING IS NOT TO SCALE

SHEET INDEX

PROJECT SCOPE

NEW CONSTRUCTION OF A SINGLE STORY ADMINISTRATION AND COMMUNITY BUILDING ON AN EXISTING VACANT LOT. STRUCTURE TO CONSIST OF MASONRY WALLS, STANDING SEAM METAL ROOF, INTERIOR PARTITIONS, ENCLOSED OFFICE SPACE, LOBBY, RECEPTION AREA, MEETING ROOMS, EQUIPMENT YARD, GARAGE, 3,068SF OUTDOOR COVERED GATHERING AREA, TRASH ENCLOSURE AND PARKING. HVAC, INTERIOR / EXTERIOR LIGHTING, LANDSCAPING, AND A FIRE SUPPRESSION SYSTEM TO BE INCORPORATED.

PROJECT TEAM

ARCHITECT:	DAVY ARCHITECTURE 811 10TH AVENUE SAN DIEGO, CA 92101 (P) 619-238-3811 X 29 CONTACT: JIM MURRAY JMURRAY@DAVYARCHITECTURE.COM
CITY OF SAN DIEGO:	PUBLIC WORKS DEPARTMENT 525 B STREET, SUITE 750 SAN DIEGO, CA, 92101 (P) 619-533-6657 CONTACT: JORGE A. ACEVEDO ACEVEDOJ@SANDIEGO.GOV
CIVIL ENGINEER:	OMEGA CONSULTING ENGINEERS 4340 VIEWRIDGE AVE., SUITE B SAN DIEGO, CA 92123 (P) 858-634-8620 CONTACT: SEAN SAVAGE SEAN@OMEGA-CONSULTANTS.COM
LANDSCAPE ARCHITECT:	SPURLOCK POIRIER LANDSCAPE ARCHITECTS 2122 HANCOCK STREET SAN DIEGO, CA 92110 (P) 619-681-0090 X116 CONTACT: AMELIA CAPRON ACAPRON@SP-LAND.COM
STRUCTURAL ENGINEER:	GSSI STRUCTURAL ENGINEERS 3969 FIRST AVENUE, SUITE 200 SAN DIEGO, CA 92103 (P) 619-687-3810 CONTACT: OMAR GONZALEZ OOGONZALEZ@GSSI-SE.COM
MECHANICAL ENGINEER:	WALSH ENGINEERS 4499 RUFFIN RD., SUITE 100 SAN DIEGO, CA 92123 (P) 858-541-0788 CONTACT: BILL TZIOUVARAS BTZIOUVARAS@WALSHENGINEERS.COM
ELECTRICAL ENGINEER:	MICHAEL WALL ENGINEERING 4115 SORRENTO VALLEY BLVD. SAN DIEGO, CA 92121 (P) 858-638-0600 CONTACT: BRYAN WAYNE BWAYNE@MWALLENG.COM
FIRE PROTECTION:	TK1SC COLLABORATIVE 4225 EXECUTIVE SQUARE, SUITE 1050 LA JOLLA, CA 92037 (P) 858-362-6838 CONTACT: DEREK DUVAL DDUVAL@TK1SC.COM
FURNITURE CONSULTANT:	PARRON HALL 9655 GRANITE RIDGE DRIVE, SUITE 100 SAN DIEGO, CA 92123 (P) 619-701-7658 CONTACT: JAMILA LONDON JLONDON@PARONHALL.COM

G1.0

AS-BUILT INFORMATION

MATERIALS	MANUFACTURER

CONSULTANT

DAVY ARCHITECTURE
SERVICE-DISABLED VETERAN-OWNED
1053 TENTH AVENUE
SAN DIEGO, CA 92102
PHONE 619.238.3811
FAX 619.238.0442
WWW.DAVYARCHITECTURE.COM

ERIC H. DAVY #C014151 REGISTERED ARCHITECT STATE OF CALIFORNIA EXPIRES AUGUST 31, 2019

The City of SAN DIEGO Public Works

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 1 OF 123 SHEETS

APPROVED
FOR CITY ENGINEER 9/12/2017 DATE
JASON GRANI C77208 RCE#
PRINT DCE NAME

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL			08/31/2017	
G ADDENDUM G			03/23/2018	

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

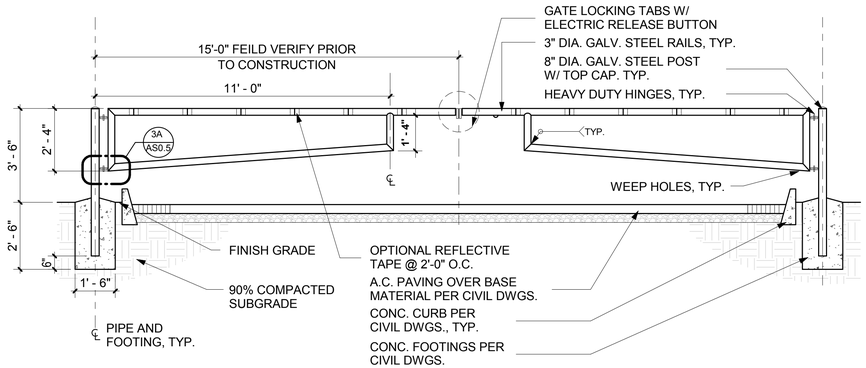
WBS S-14016

JORGE ACEVEDO
PROJECT MANAGER
MARLON PEREZ
PROJECT ENGINEER
246-1761
CCS27 COORDINATE
1889-6321
CCS83 COORDINATE

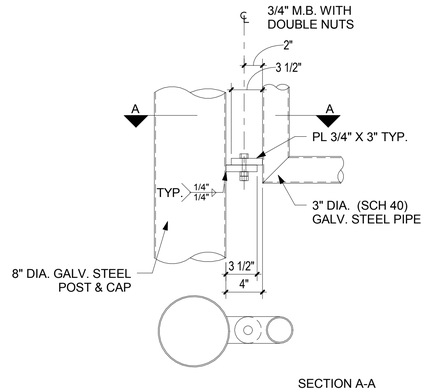
39038 - 1 - D

ADDENDUM G

MISSION TRAILS FIELD STATION EAST FORTUNA

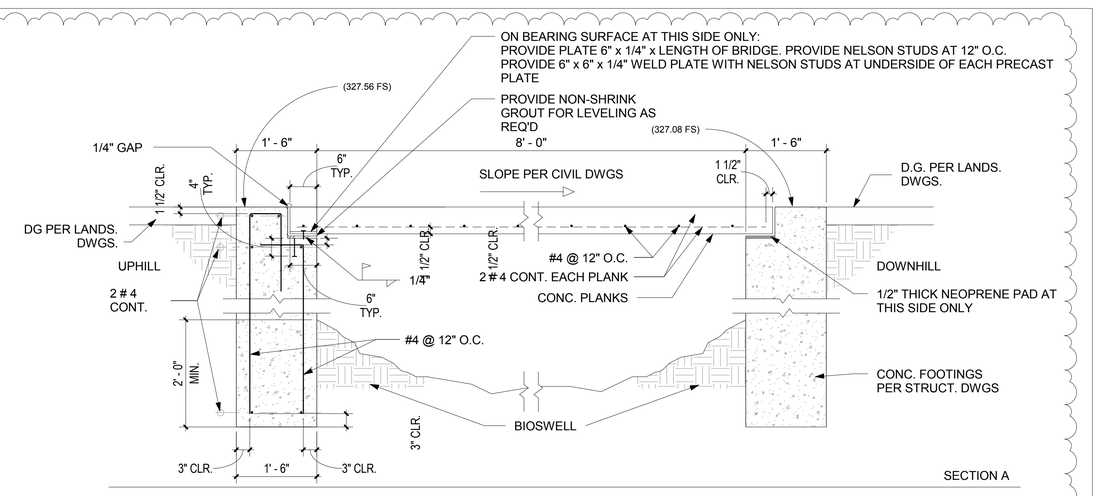


NOTES;
1. HOT DIP GALVANIZE ALL METAL
2. GRIND SMOOTH ALL WELDS AFTER FABRICATION
3. PROVIDE SHOP DRAWINGS FOR APPROVAL PRIOR TO CONSTRUCTION

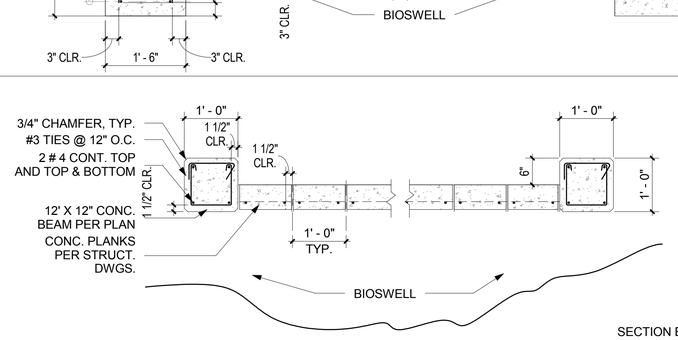


SECTION A-A
SCALE: 1-1/2" = 1'-0"

DUAL TRAFFIC BARRIER GATE 3
3/8" = 1'-0"

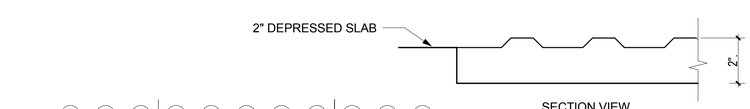


SECTION A

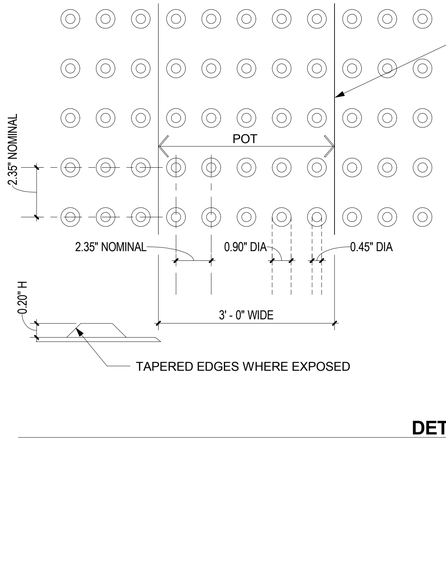


SECTION B

PEDESTRIAN BRIDGE 1
3/4" = 1'-0"



SECTION VIEW

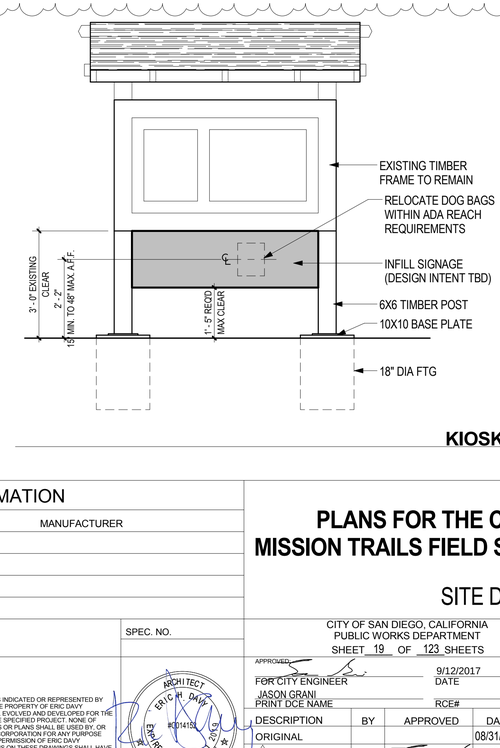


NOTES:

1. DETECTABLE WARNING SURFACES SHALL CONTRAST VISUALLY WITH ADJACENT WALKING SURFACES EITHER LIGHT-ON-DARK OR DARK-ON-LIGHT. THE MATERIAL USED TO PROVIDE CONTRAST SHALL BE AN INTEGRAL PART OF THE SURFACE.
2. DETECTABLE WARNING SURFACES SHALL BE YELLOW CONFORMING TO FS 33538 OF FEDERAL STANDARD 595C.
3. ONLY APPROVED DSA-AC DETECTABLE WARNING PRODUCTS AND DIRECTIONAL SURFACES SHALL BE INSTALLED AS PROVIDED IN THE CALIFORNIA CODE OF REGULATIONS (CCR), TITLE 24, PART 1, CHAPTER 5, ARTICLE 2, 3 AND 4
4. CONTRACTOR TO PROVIDE 5 YEAR WARRANTY ON PRODUCT
5. DETECTABLE WARNING SURFACE SHALL BE FROM THE CURRENT CITY OF SAN DIEGO APPROVED MATERIAL LIST

REFERENCE:
CITY OF SAN DIEGO STANDARD DETAIL SDG-130

DETECTABLE WARNING TILE SURFACE 4
3/4" = 1'-0"



KIOSK MODIFICATION 2
1/2" = 1'-0"

AS0.5

MISSION TRAILS FIELD STATION EAST FORTUNA

AS-BUILT INFORMATION

MATERIALS	MANUFACTURER

CONSULTANT

DAVY ARCHITECTURE
SERVICE DISABLED VETERAN OWNED
1053 TENTH AVENUE
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WWW.DAVYARCHITECTURE.COM

ERIC H. DAVY #C31410 REGISTERED ARCHITECT STATE OF CALIFORNIA EXPIRES AUGUST 31, 2019

SPEC. NO.

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 19 OF 123 SHEETS

APPROVED
FOR CITY ENGINEER — 9/12/2017 DATE
JASON GRANI
PRINT DCE NAME — RCE#

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL			08/31/2017	
G ADDENDUM G			03/23/2018	

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

PLANS FOR THE CONSTRUCTION OF MISSION TRAILS FIELD STATION EAST FORTUNA

SITE DETAILS

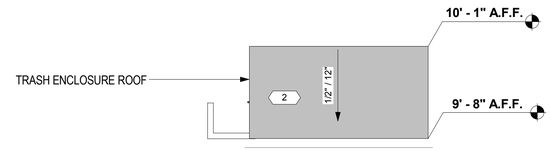
WBS	S-14016
JORGE ACEVEDO	PROJECT MANAGER
MARLON PEREZ	PROJECT ENGINEER
246-1761	CCS27 COORDINATE
1889-6321	CCS83 COORDINATE
39038 - 19 - D	

CONSTRUCTION CHANGE / ADDENDUM

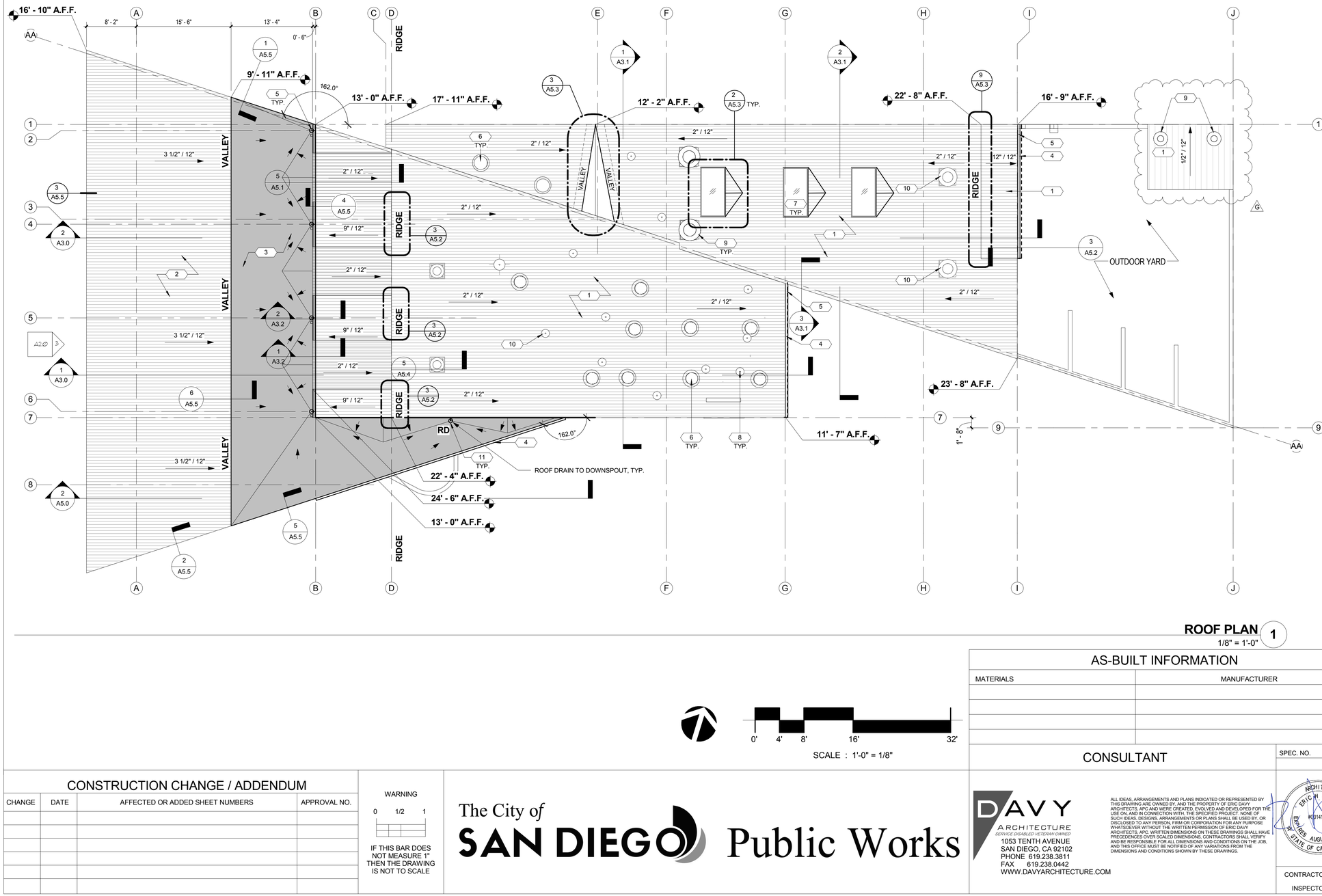
CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN THE DRAWING IS NOT TO SCALE

The City of SAN DIEGO Public Works



TRASH ENCLOSURE ROOF PLAN 2
1/8" = 1'-0"



ROOF PLAN 1
1/8" = 1'-0"

CONSTRUCTION NOTES

#	
1	STANDING SEAM METAL ROOF (TYPICAL ROOF ASSEMBLY)
2	STANDING SEAM METAL ROOF W/ 1-1/2" MTL DECK (SLOPING CANOPY ASSEMBLY)
3	SINGLE PLY T.P.A. ROOFING WITH TAPERED INSULATION
4	GUTTER
5	DOWNSPOUT
6	SOLATUBE (SEE DETAILS ON A-5.4)
7	SKYLIGHT WITH CRICKETS (SEE DETAILS ON A5.3)
8	8" EXHAUST DUCT (SEE MECHANICAL ROOF PLAN M2.1)
9	GRAVITY VENT (SEE MECHANICAL ROOF PLAN M2.1) SEE 5 / A5.4
10	EXHAUST DUCT (SEE MECHANICAL ROOF PLAN M2.1)
11	ROOF DRAIN PER NOTE 6 BELOW

GENERAL ROOF PLAN NOTES

1. ROOF GUTTERS SHALL BE PROVIDED WITH THE MEANS TO PREVENT THE ACCUMULATION OF LEAVES AND DEBRIS IN THE GUTTER. ALL ROOF GUTTERS AND DOWNSPOUTS SHALL BE CONSTRUCTED OF NON-COMBUSTIBLE MATERIALS (CBC 705A.4)
2. DRIP EDGE FLASHING USED AT THE FREE EDGES OF ROOFING MATERIALS SHALL BE NON-COMBUSTIBLE (CBC 705A.4.1)
3. VALLEY FLASHING SHALL BE NOT LESS THAN 0.019-INCH (NO. 26 GALVANIZED SHEET GAGE) CORROSION-RESISTANT METAL INSTALLED OVER A MINIMUM 36-INCH-WIDE UNDERLAYMENT CONSISTING OF ONE LAYER OF NO. 72 ASTM CAP SHEET RUNNING THE FULL LENGTH OF THE VALLEY (CBC 705A.3)
4. ALL VENT OPENINGS SHALL BE PROTECTED BY NON-COMBUSTIBLE, CORROSION RESISTANT MESH THAT MEET THE REQUIREMENTS OF CBC 706A.2 AND 706A.4
5. ALL FLASHING AND ROOF JACKS SHOULD BE MINIMUM 24 GAUGE GALVANIZED METAL, PER FACILITIES DIVISION STANDARDS AND SPECIFICATIONS GUIDELINE
6. ROOF DRAINS TO BE INSTALLED IN THE LOW SLOPE AREA OF THE ROOF CANOPY SHALL BE JR SMITH, MODEL 1010 SERIES WITH MANUFACTURER'S SHEET METAL SUMP, 3 INCH. PROVIDE A TRANSITION FROM THE OUTLET OF THE DRAIN BODY TO THE SHEET METAL DOWNSPOUT.

MISSION TRAILS FIELD STATION EAST FORTUNA

A1.3

SCALE : 1'-0" = 1/8"

AS-BUILT INFORMATION

MATERIALS	MANUFACTURER

PLANS FOR THE CONSTRUCTION OF MISSION TRAILS FIELD STATION EAST FORTUNA

ROOF PLAN

CONSULTANT

DAVY ARCHITECTURE
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SAN DIEGO, CA 92102
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FAX 619.238.0442
WWW.DAVYARCHITECTURE.COM

ARCHITECT ERIC H. DAVY #C31412 EXPIRES AUGUST 31, 2019 STATE OF CALIFORNIA

SPEC. NO.

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 22 OF 123 SHEETS

APPROVED
FOR CITY ENGINEER — 9/12/2017 DATE
JASON GRANI
PRINT DCE NAME — RCE#

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL			08/31/2017	
G ADDENDUM G			03/23/2018	

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

WBS	S-14016
	JORGE ACEVEDO
PROJECT MANAGER	
	MARLON PEREZ
PROJECT ENGINEER	
	246-1761
	CCS27 COORDINATE
	1889-6321
	CCS83 COORDINATE
	39038 - 22 - D

G ELECTRICAL & STORAGE ROOMS ROOF

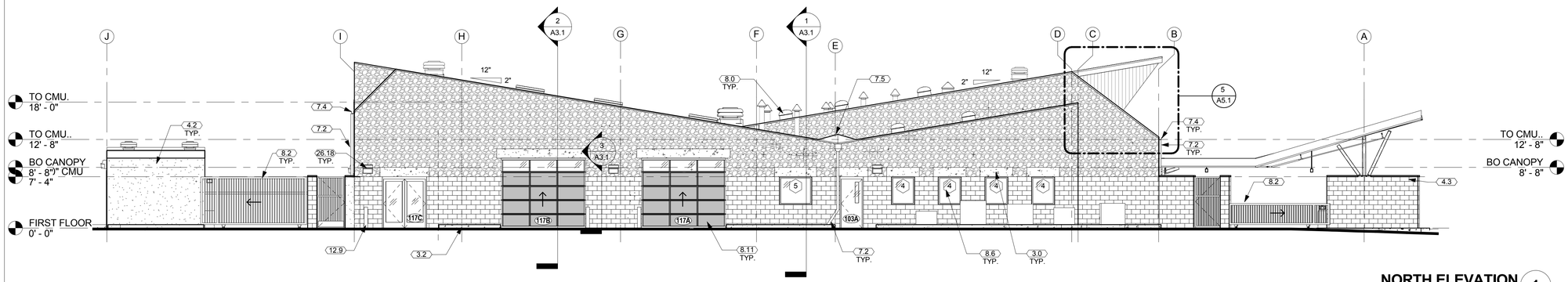
ADDENDUM G

CONSTRUCTION CHANGE / ADDENDUM

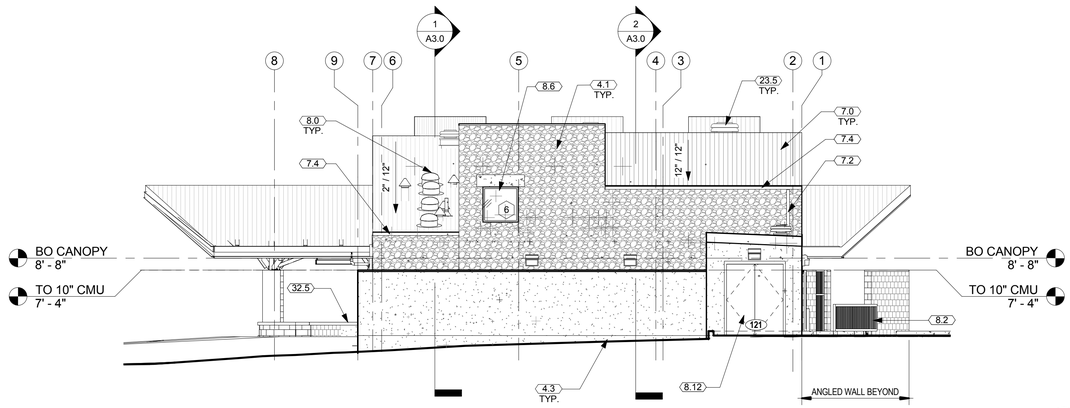
CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN THE DRAWING IS NOT TO SCALE

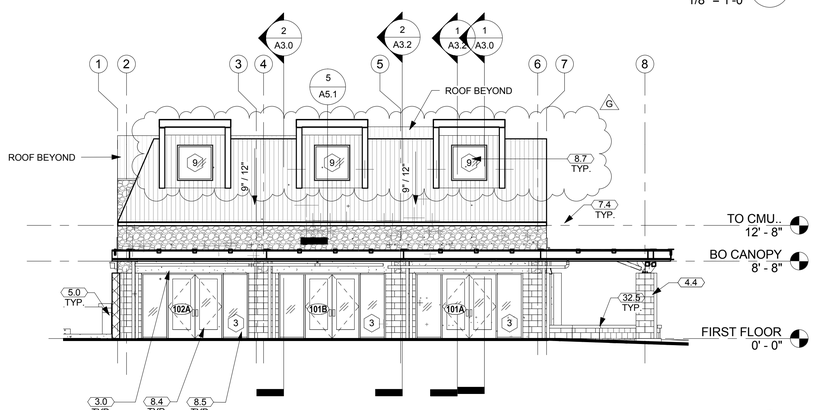
The City of SAN DIEGO Public Works



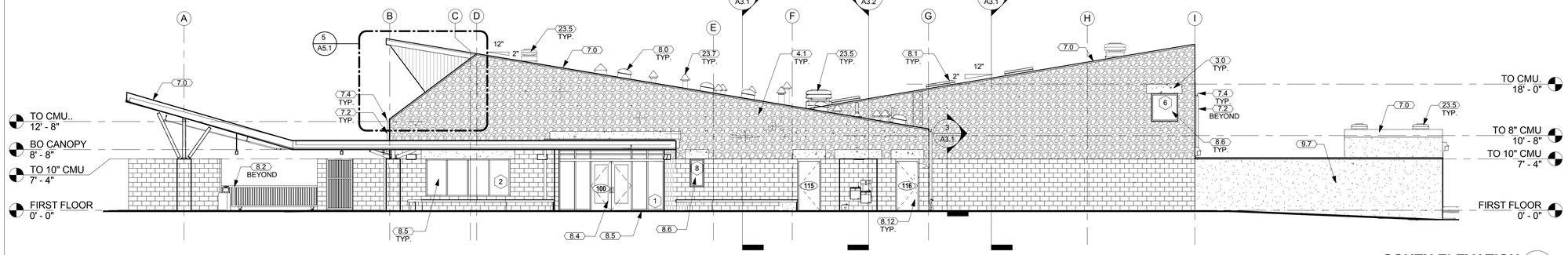
NORTH ELEVATION 1
1/8" = 1'-0"



EAST ELEVATION 2
1/8" = 1'-0"



WEST ELEVATION 3
1/8" = 1'-0"



SOUTH ELEVATION 4
1/8" = 1'-0"

CONSTRUCTION NOTES

3.0	CAST-IN-PLACE CONCRETE LINTEL; SEE DETAILS 1/A3.4, 13&14/S-802
3.2	6" CONCRETE CURB, SEE CIVIL
4.1	FLAGSTONE VENEER OVER 8" CMU, SEE DETAIL 4/A3.4
4.2	10" CMU BLOCK WALL; SEE DETAIL 3/A3.4 SIM.
4.3	8" CMU BLOCK WALL; SEE DETAIL 3/A3.4
4.4	8" CMU PIER COLUMN PER STRUCTURAL
5.0	STEEL COLUMN PER STRUCTURAL
7.0	STANDING SEAM METAL ROOFING, SEE ROOF DETAILS SHEETS A5.3 & A5.4
7.2	ROOF DOWNSPOUT LOCATION; SHALL BE PROTECTED BY LEAF SCREENS OR APPROVED EQUAL; SEE DETAIL XX/XX
7.4	ROOF GUTTER; SHALL BE PROTECTED BY LEAF SCREENS OR APPROVED EQUAL; SEE DETAIL XX/XX
7.5	SHEET METAL CRICKET; SEE DETAIL 3/A8.8 SIM.
8.0	SOLARTUBE; INSTALL PER MANUFACTURE; SEE DETAIL1/A5.4
8.1	4'X 8' UNIT SKYLIGHT, SEE DETAIL 2/A5.3 AND STRUCTURAL FOR FRAMING
8.2	AUTOMATIC SLIDING METAL GATE; INSTALL PER MANUFACTURE; SEE DOOR & GATE SCHEDULE
8.4	STOREFRONT DOUBLE DOOR; SEE DOOR & WINDOW SCHEDULE
8.5	STOREFRONT GLAZING, SEE WINDOW SCHEDULE
8.6	DUAL-GLAZED ALUMINUM WINDOWS, TEMPERED EXTERIOR GLAZING, SEE WINDOW SCHEDULE
8.7	DUAL-GLAZED ALUMINUM DORMER WINDOWS, TEMPERED EXTERIOR GLAZING, SEE WINDOW SCHEDULE
8.11	ALUMINMUM SECTIONAL GARAGE DOOR (CLOPAY COMMERICAL OR APPROVED EQUAL); INSTALL PER MANUFACTURE; SEE DOOR AND WINDOW SCHEDULE
8.12	HOLLOW METAL DOORS; SEE DOOR WINDOW SCHEDULE
9.7	SHOWER TILE, SEE FINISH SCHEDULE
12.9	6" DIAMETER BOLLARD; SEE DETAIL -/--
23.5	GRAVITY VENT, LOCATION ONLY, SEE MECHANICAL
23.7	EXHAUST DUCT, LOCATION ONLY; SEE MECHANICAL
26.18	EXTERIOR LIGHTING; SEE ELECTRICAL
32.5	RAISED CMU PLANTER SEAT WALL W/ RADIUS; SEE DETAIL 10/AS0.3

GENERAL NOTES

1. PROVIDE SHEET METAL DOWNSPOUTS PER SECTION 076200 TO COMPLY WITH SMACNA "ARCHITECTURAL SHEET METAL MANUAL". THE DOWNSPOUTS SHALL BE 2" x 3" X 26 GAGE WITH 3 COAT FLUOROPOLYMER FINISH PER 076200.2.B.4. THE DOWNSPOUT AT E 1 SHALL BE 3" x 4" RECTANGLE. DETAIL THE DOWNSPOUTS PER SMACNA FIGURE B, PROVIDE CONDUCTOR PER SMACNA PLATE 25, FIGURE F. THE DOWNSPOUTS SHALL ENTER THE STORM DRAINS IDENTIFIED ON SHEET C-3. PROVIDE A CAST-IRON HUB RECEIVER TO EXTEND 6 INCHES ABOVE THE FINISHED GRADE DOWN THE PVC PIPES SIMILAR TO DETAIL C/C-6.

0' 4' 8' 16' 32'

SCALE : 1'-0" = 1/8"

MISSION TRAILS FIELD STATION EAST FORTUNA

A2.0

AS-BUILT INFORMATION

MATERIALS	MANUFACTURER

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING

0 1/2 1

IF THIS BAR DOES NOT MEASURE 1" THEN THE DRAWING IS NOT TO SCALE

The City of SAN DIEGO Public Works

CONSULTANT

DAVY ARCHITECTURE
SERVICE DISABLED VETERAN OWNED
1053 TENTH AVENUE
SAN DIEGO, CA 92102
PHONE 619.238.3811
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WWW.DAVYARCHITECTURE.COM

SPEC. NO.

ERIC H. DAVY #C10415 LICENSED ARCHITECT AUGUST 31, 2019 STATE OF CALIFORNIA

PLANS FOR THE CONSTRUCTION OF MISSION TRAILS FIELD STATION EAST FORTUNA

EXTERIOR ELEVATIONS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 23 OF 123 SHEETS

WBS S-14016

APPROVED
FOR CITY ENGINEER — 9/12/2017 DATE
JASON GRANI
PRINT DCE NAME — RCE#

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL			08/31/2017	
G ADDENDUM G			09/23/2018	

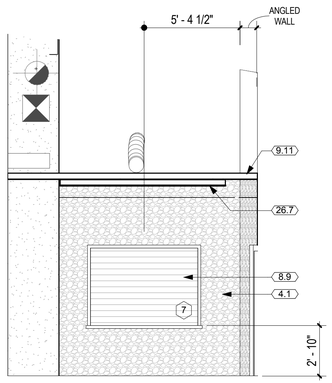
JORGE ACEVEDO	PROJECT MANAGER
MARLON PEREZ	PROJECT ENGINEER
246-1761	CCS27 COORDINATE
1889-6321	CCS83 COORDINATE

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

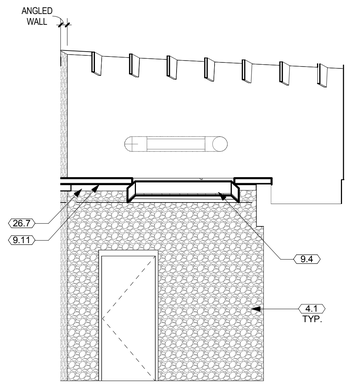
39038 - 23 - D

G DORMER WINDOWS

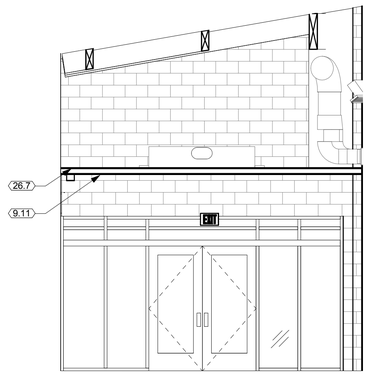
ADDENDUM G



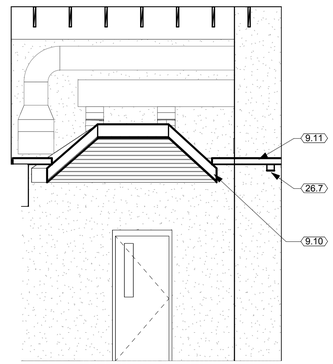
100 LOBBY NORTH 1
1/4" = 1'-0"



100 LOBBY EAST 2
1/4" = 1'-0"



100 LOBBY SOUTH 3
1/4" = 1'-0"

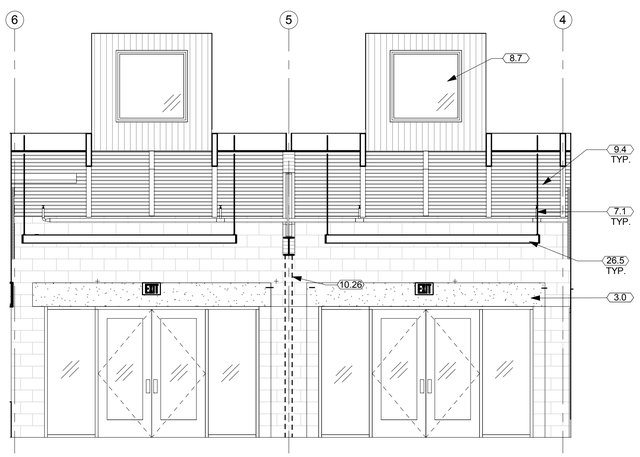


100 LOBBY WEST 4
1/4" = 1'-0"

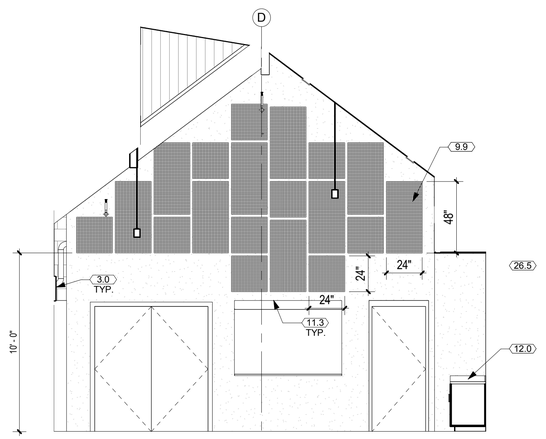
CONSTRUCTION NOTES

#	
3.0	CAST-IN-PLACE CONCRETE LINTEL; SEE DETAILS 1/A3.4, 13&14/S-802
4.1	FLAGSTONE VENEER OVER 8" CMU, SEE DETAIL 4/A3.4
7.1	FIRE SPRINKLER PER FIRE PROTECTION PLANS
8.7	DUAL-GLAZED ALUMINUM DORMER WINDOWS, TEMPERED EXTERIOR GLAZING, SEE WINDOW SCHEDULE
8.9	METAL ROLL-DOWN COUNTER WINDOW; SEE DETAIL 14/A6.1 & DOOR AND WINDOW SCHEDULE A6.0
9.4	TONGUE AND GROOVE WOOD CEILING; SEE DETAIL 7/A8.0
9.9	ACOUSTICAL WALL PANELS 4'X2' & 2'X2'; SPACING AT 2" CLR.; INSTALL PER MANUFACTURERS RECOMMENDATIONS. LAMVIN (OR APPROVED EQUAL) 5/8" THICK FABRIC COVERED ACOUSTICAL WALL PANELS. FABRIC TO BE SELECTED FROM MANUFACTURERS FULL RANGE. PROVIDE MANUFACTURER'S STANDARD WALL ATTACHEMENT SYSTEM. SEE DETAIL 14/A9.0.
9.10	PYRAMID SUSPENDED GYPSUM BOARD CEILING WITH TONGUE & GROOVE PANELLING; SEE SHEET A8.0
9.11	GYPBOARD CEILING SOFFIT; SEE A8.0
10.26	FOLDING PANEL PARTITION WALL & TRACK ASSEMBLY; SEE DETAIL 4/A8.4
11.3	WALL-MOUNT PROJECTOR SCREEN
12.0	SOLID QUARTZ COUNTERTOP WITH BASE CABINETS, SEE DETAIL 3/A9.0
23.3	SIDEWALL DIFFUSER, LOCATION ONLY, SEE MECHANICAL
26.5	LED LINEAR PENDANT LIGHT; SEE ELECTRICAL
26.7	LED LINEAR SOFFIT LIGHT FIXTURE, SEE ELECTRICAL

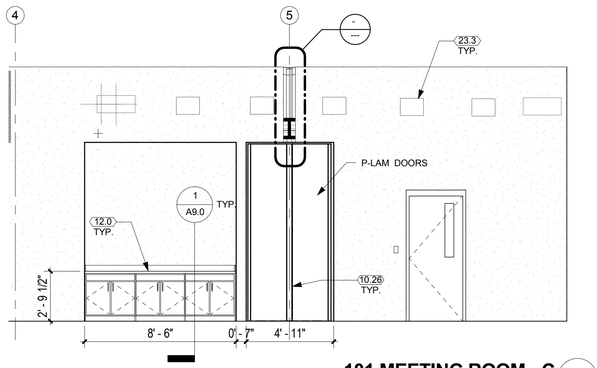
G



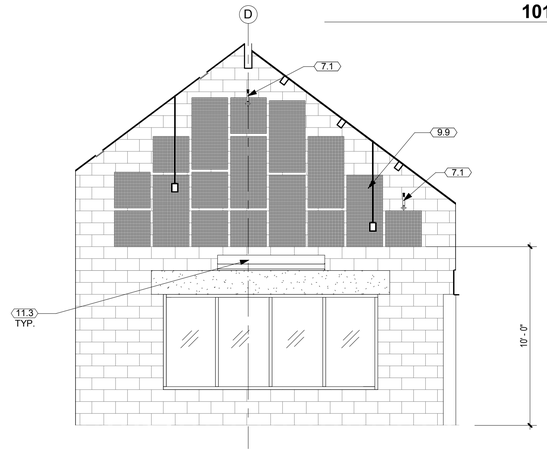
101 MEETING ROOM - A 5
1/4" = 1'-0"



101 MEETING ROOM - B 6
1/4" = 1'-0"



101 MEETING ROOM - C 7
1/4" = 1'-0"



101 MEETING ROOM - D 8
1/4" = 1'-0"

0' 2' 4' 8' 16'

SCALE : 1'-0" = 1/4"

PLANS FOR THE CONSTRUCTION OF MISSION TRAILS FIELD STATION EAST FORTUNA

INTERIOR ELEVATIONS

A4.1

MISSION TRAILS FIELD STATION EAST FORTUNA

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN THE DRAWING IS NOT TO SCALE

The City of SAN DIEGO Public Works

CONSULTANT

DAVY ARCHITECTURE
SERVICE DISABLED VETERAN OWNED
1053 TENTH AVENUE
SAN DIEGO, CA 92102
PHONE 619.238.3811
FAX 619.238.0442
WWW.DAVYARCHITECTURE.COM

ERIC H. DAVY #C014152 ARCHITECT 2019 EXPIRES AUGUST 31 STATE OF CALIFORNIA

SPEC. NO.

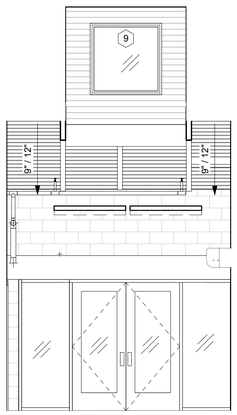
CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 30 OF 123 SHEETS

APPROVED
FOR CITY ENGINEER — 9/12/2017 DATE
JASON GRANI — RCE#
PRINT DCE NAME

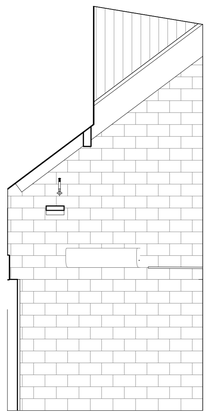
DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL			08/31/2017	
G ADDENDUM G			03/23/2018	

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

WBS S-14016
JORGE ACEVEDO
PROJECT MANAGER
MARLON PEREZ
PROJECT ENGINEER
246-1761
CCS27 COORDINATE
1889-6321
CCS83 COORDINATE
39038 - 30 - D



102 EQUIPMENT - A 9
1/4" = 1'-0"
G



102 EQUIPMENT - B 10
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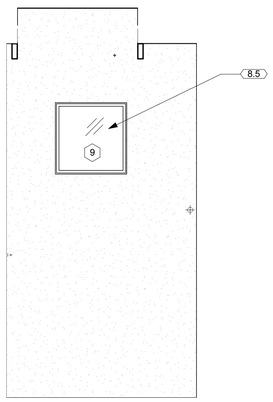
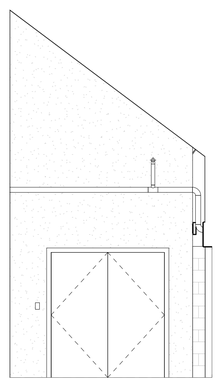


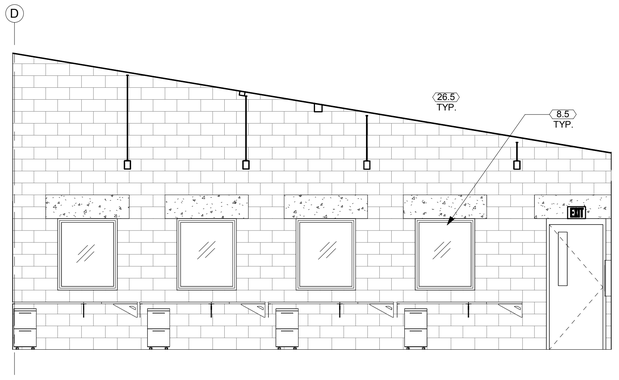
102 EQUIPMENT - C 11
1/4" = 1'-0"
G



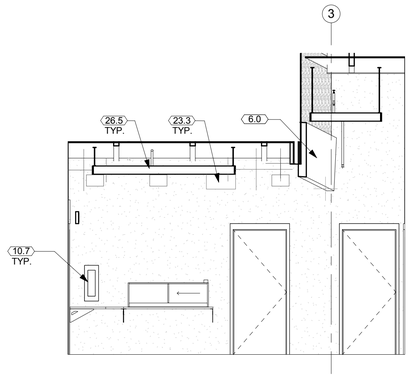
102 EQUIPMENT - D 12
1/4" = 1'-0"

CONSTRUCTION NOTES

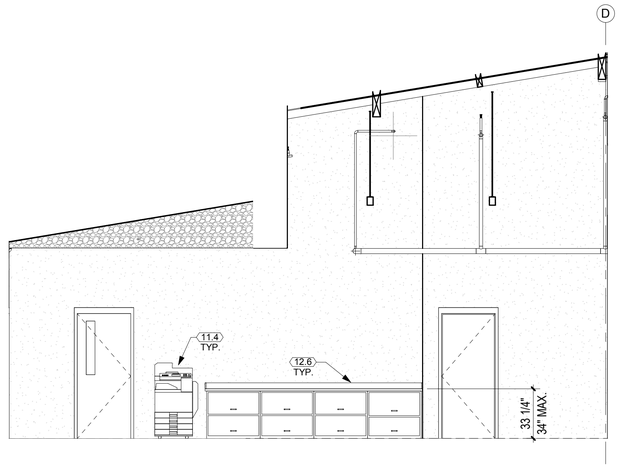
#	
6.0	5 1/8" GLULAM BEAM PER STRUCTURAL
8.5	STOREFRONT GLAZING, SEE WINDOW SCHEDULE
8.6	DUAL-GLAZED ALUMINUM WINDOWS, TEMPERED EXTERIOR GLAZING, SEE WINDOW SCHEDULE
10.7	SURFACE MOUNTED PAPER TOWEL DISPENSER (B-4262); FOR MOUNTING HEIGHTS SEE 9/A9.2
11.4	COPIER, O.F.C.I., MOVEABLE EQUIPMENT, DOES NOT REQUIRE ANCHORAGE; PROVIDE POWER AND DATA; SEE ELECTRICAL
12.6	SYSTEM FURNITURE
23.3	SIDEWALL DIFFUSER, LOCATION ONLY, SEE MECHANICAL
26.5	LED LINEAR PENDANT LIGHT; SEE ELECTRICAL



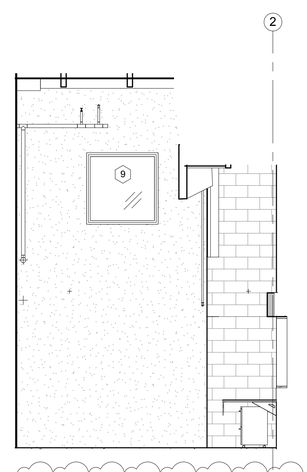
103 OFFICE - A 1
1/4" = 1'-0"



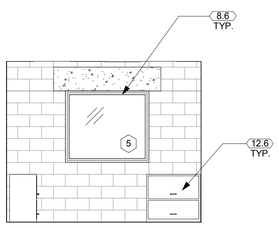
103 OFFICE - B 2
1/4" = 1'-0"



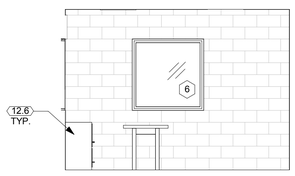
103 OFFICE - C 3
1/4" = 1'-0"



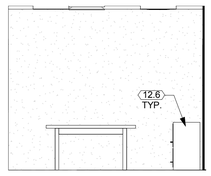
103 OFFICE - D 4
1/4" = 1'-0"
G



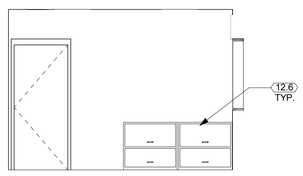
104 RANGER OFFICE - A 5
1/4" = 1'-0"



104 RANGER OFFICE - B 6
1/4" = 1'-0"



104 RANGER OFFICE - C 7
1/4" = 1'-0"



104 RANGER OFFICE - D 8
1/4" = 1'-0"

MISSION TRAILS FIELD STATION EAST FORTUNA

A4.3

AS-BUILT INFORMATION

MATERIALS	MANUFACTURER

PLANS FOR THE CONSTRUCTION OF MISSION TRAILS FIELD STATION EAST FORTUNA

INTERIOR ELEVATIONS

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING

0 1/2 1

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The City of SAN DIEGO Public Works

CONSULTANT

DAVY ARCHITECTURE
SERVICE DISABLED VETERAN OWNED
1053 TENTH AVENUE
SAN DIEGO, CA 92102
PHONE 619.238.3811
FAX 619.238.0442
WWW.DAVYARCHITECTURE.COM

SPEC. NO.

ARCHITECT ERIC H. DAVY #C014102 REGISTERED AUGUST 31, 2007 STATE OF CALIFORNIA

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 32 OF 123 SHEETS

APPROVED
FOR CITY ENGINEER — 9/12/2017 DATE
JASON GRANI — RCE#
PRINT DCE NAME

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL			08/31/2017	
G ADDENDUM G			03/23/2018	

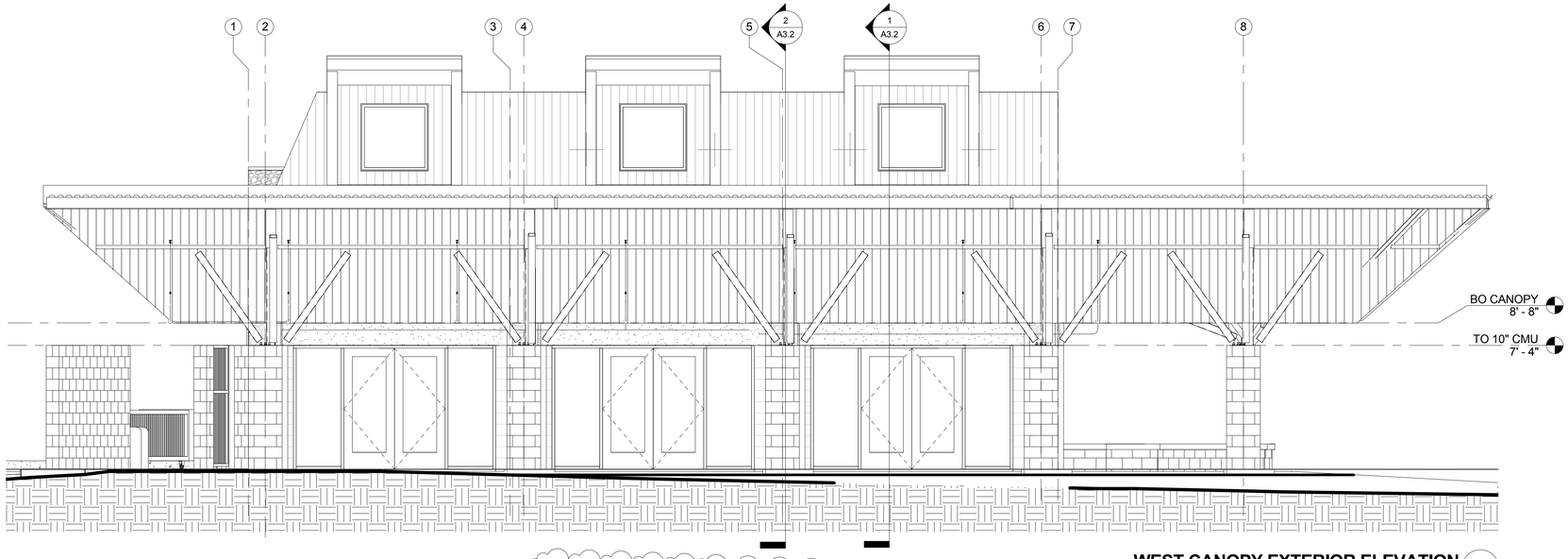
CONTRACTOR — DATE STARTED
INSPECTOR — DATE COMPLETED

WBS S-14016

JORGE ACEVEDO — PROJECT MANAGER
MARLON PEREZ — PROJECT ENGINEER
246-1761 — CCS27 COORDINATE
1889-6321 — CCS83 COORDINATE
39038 - 32 - D

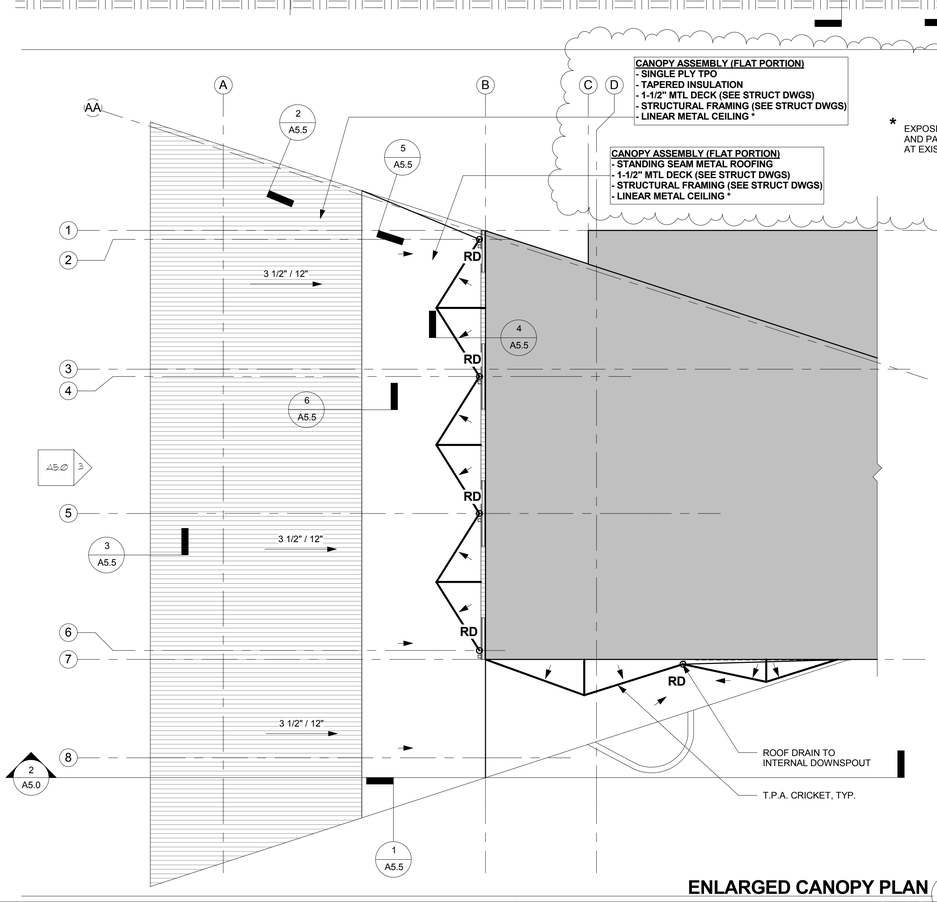
G WINDOW TAGS

ADDENDUM G



WEST CANOPY EXTERIOR ELEVATION 3

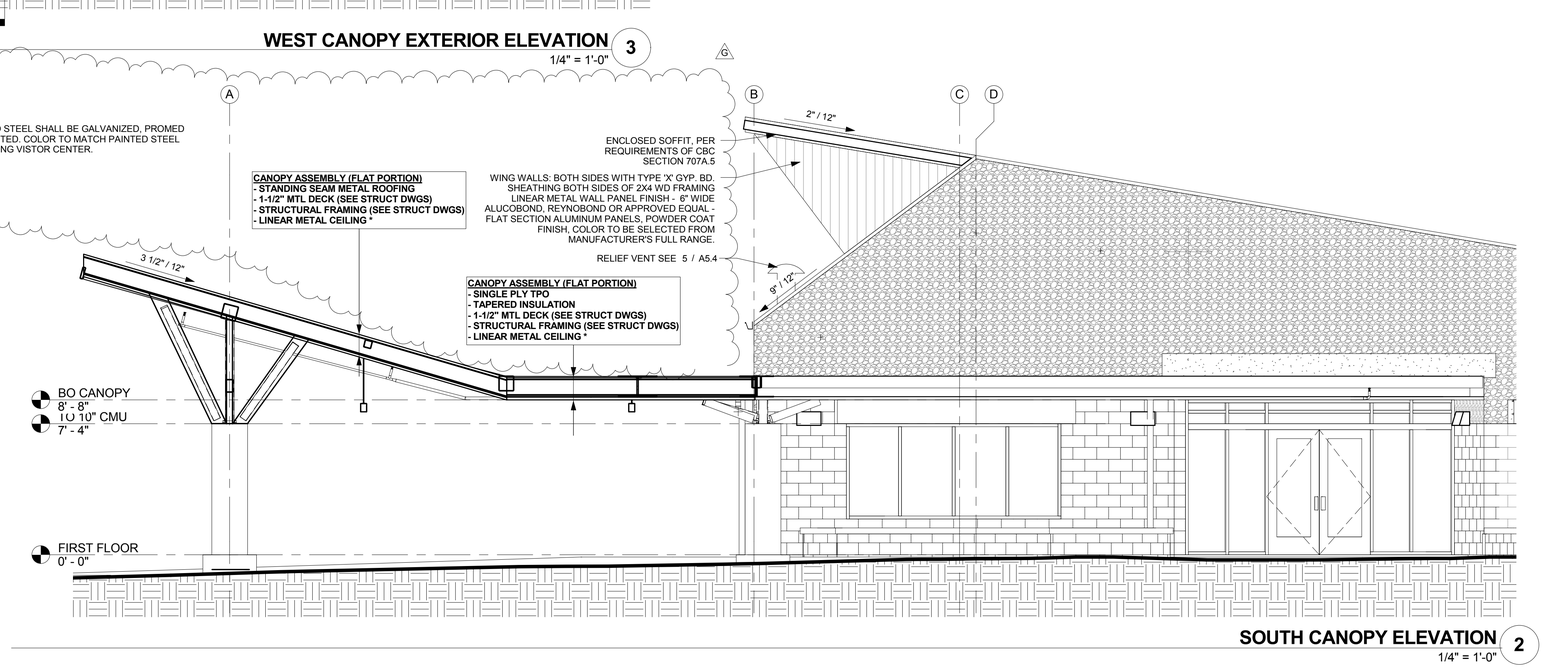
1/4" = 1'-0"



* EXPOSED STEEL SHALL BE GALVANIZED, PROMED AND PAINTED. COLOR TO MATCH PAINTED STEEL AT EXISTING VISITOR CENTER.

ENLARGED CANOPY PLAN 1

1/8" = 1'-0"



SOUTH CANOPY ELEVATION 2

1/4" = 1'-0"

MISSION TRAILS FIELD STATION EAST FORTUNA

A5.0

AS-BUILT INFORMATION

MATERIALS	MANUFACTURER

PLANS FOR THE CONSTRUCTION OF MISSION TRAILS FIELD STATION EAST FORTUNA

CANOPY DETAILS

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING

0 1/2 1

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The City of SAN DIEGO Public Works

CONSULTANT

DAVY ARCHITECTURE
SERVICE DISABLED VETERAN OWNED
1053 TENTH AVENUE
SAN DIEGO, CA 92102
PHONE 619.238.3811
FAX 619.238.0442
WWW.DAVYARCHITECTURE.COM

ERIC H. DAVY #C31412 REGISTERED ARCHITECT EXPIRES AUGUST 31, 2019 STATE OF CALIFORNIA

SPEC. NO.

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 33 OF 123 SHEETS

APPROVED _____ 9/12/2017
FOR CITY ENGINEER DATE
JASON GRANI
PRINT DCE NAME RCE#

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL			08/31/2017	
G ADDENDUM G			03/23/2018	

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

WBS S-14016

JORGE ACEVEDO
PROJECT MANAGER

MARLON PEREZ
PROJECT ENGINEER

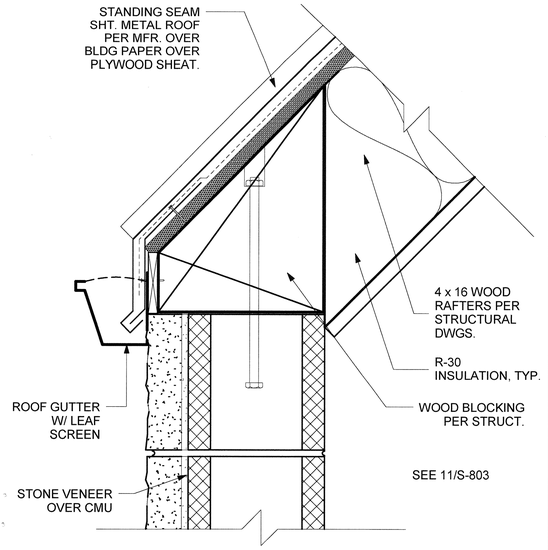
246-1761
CCS27 COORDINATE

1889-6321
CCS83 COORDINATE

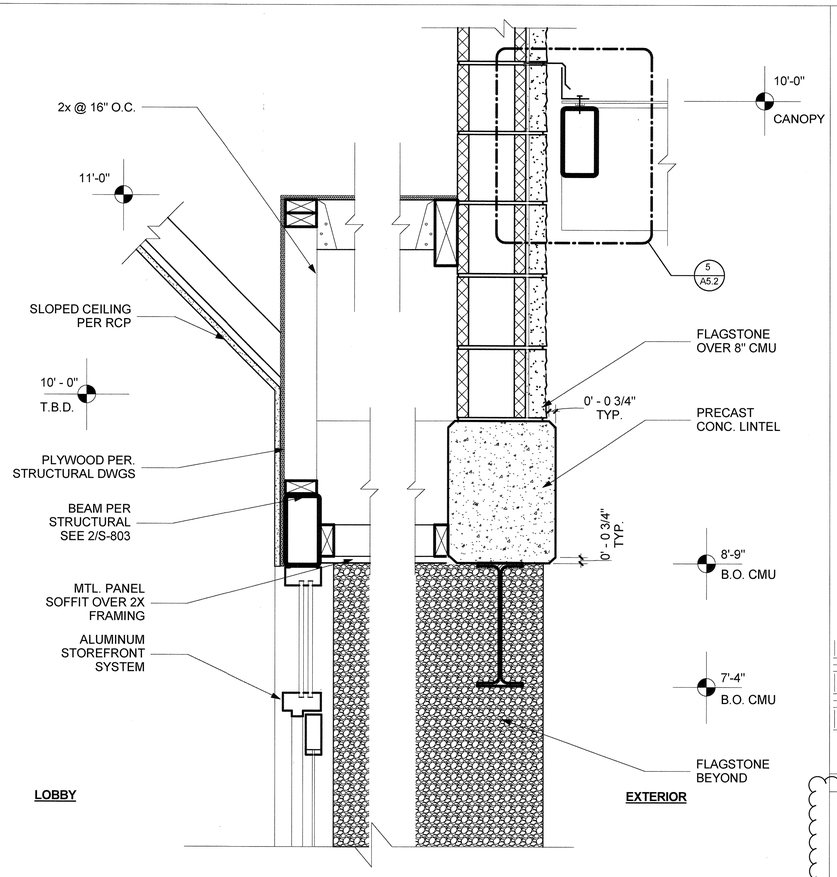
39038 - 33 - D

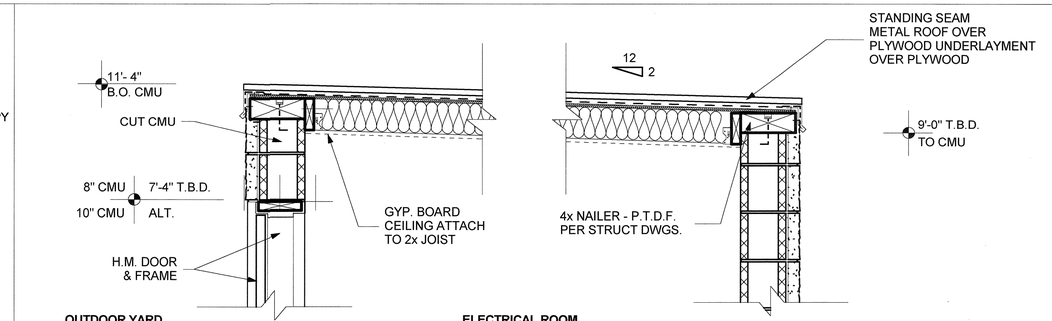
G CEILING FINISHES

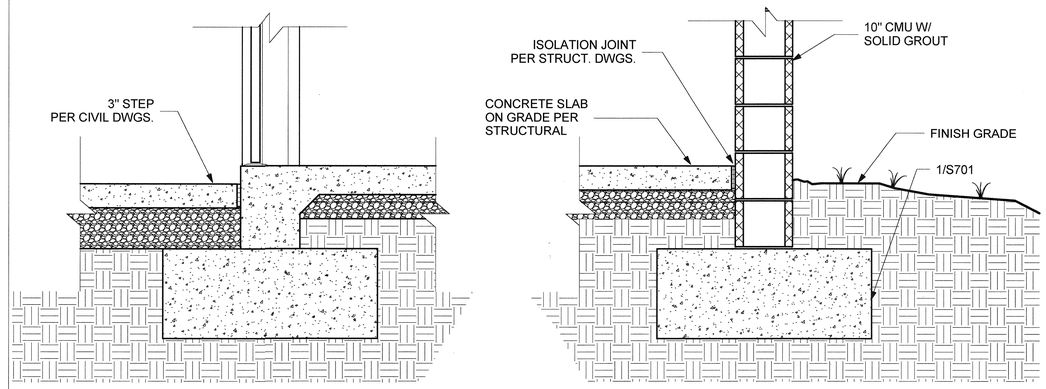
ADDENDUM G



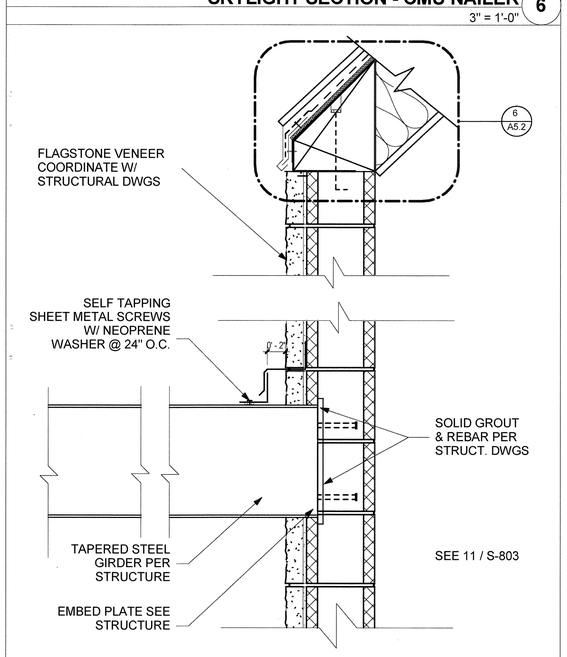
SKYLIGHT SECTION - CMU NAILER 6
3" = 1'-0"



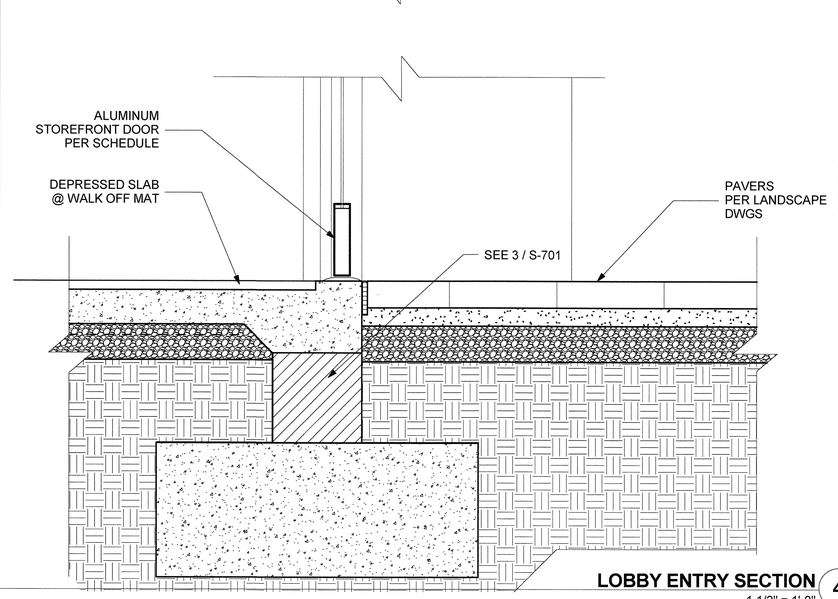




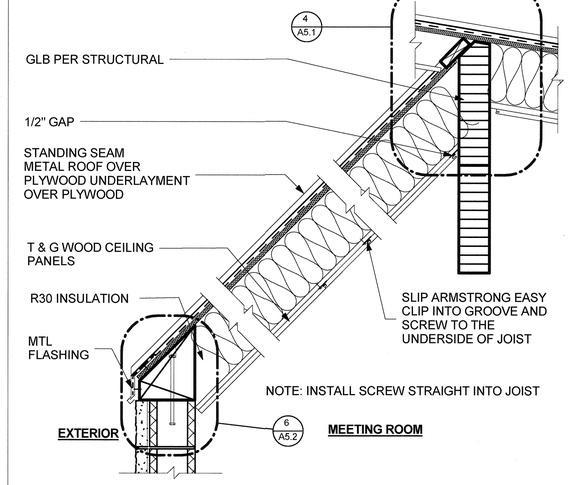
ROOF @ ELECTRICAL ROOM 1
1" = 1'-0"



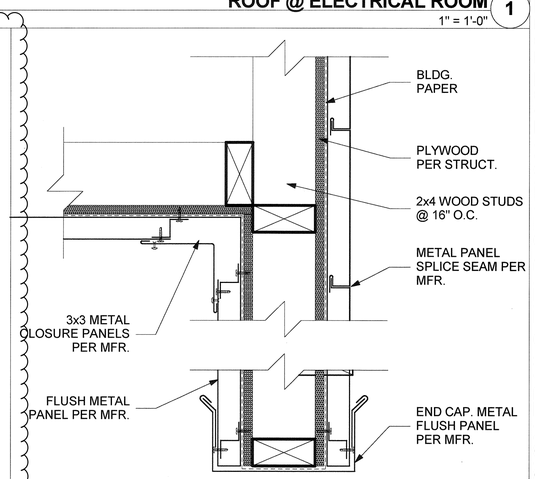
EXPANSION JOINT @ CANOPY & BUILDING 5
1 1/2" = 1'-0"



LOBBY ENTRY SECTION 4
1 1/2" = 1'-0"



WOOD T&G CEILING 3
1" = 1'-0"



DORMER EXTERIOR WING WALL 2 A5.2
3" = 1'-0"

PLANS FOR THE CONSTRUCTION OF MISSION TRAILS FIELD STATION EAST FORTUNA

ROOF DETAILS

MISSION TRAILS FIELD STATION EAST FORTUNA

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING
0 1/2 1
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The City of SAN DIEGO Public Works

CONSULTANT

DAVY ARCHITECTURE
SERVICE-DISABLED VETERAN OWNED
1053 TENTH AVENUE
SAN DIEGO, CA 92102
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FAX 619.238.0442
WWW.DAVYARCHITECTURE.COM

ERIC H. DAVY #C01418 REG. AUGUST 31, 2019 STATE OF CALIFORNIA ARCHITECT

SPEC. NO.

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 35 OF 123 SHEETS

APPROVED
FOR CITY ENGINEER — 9/12/2017 DATE
JASON GRANI
PRINT DOE NAME — RCE#

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL			02/28/2017	
G ADDENDUM G			03/23/2018	

CONTRACTOR — DATE STARTED
INSPECTOR — DATE COMPLETED

WBS S-14016

JORGE ACEVEDO
PROJECT MANAGER

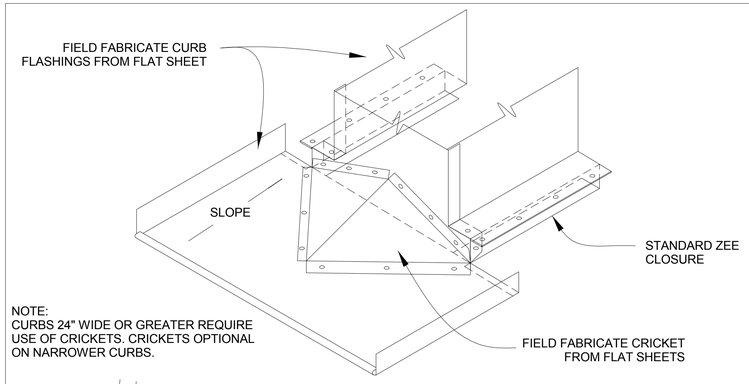
MARLON PEREZ
PROJECT ENGINEER

246-1761
CCS27 COORDINATE
1889-6321
CCS83 COORDINATE

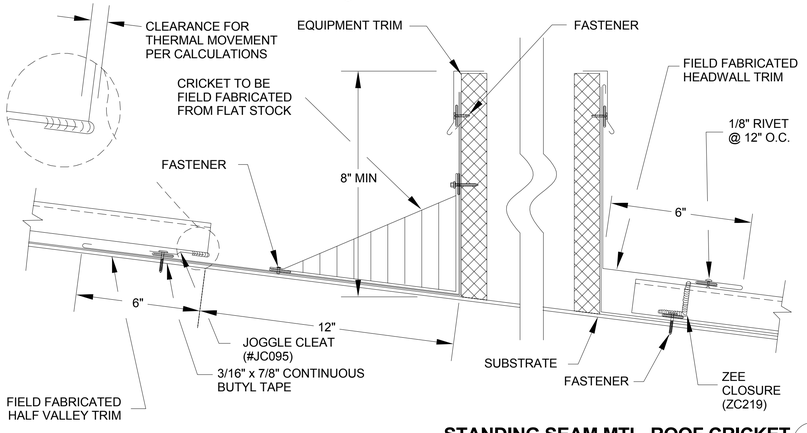
39038 - 35 - D

G Revised Details

ADDENDUM G

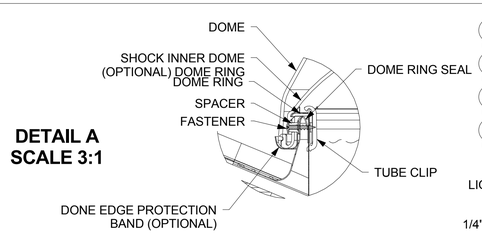


NOTE:
CURBS 24" WIDE OR GREATER REQUIRE USE OF CRICKETS. CRICKETS OPTIONAL ON NARROWER CURBS.

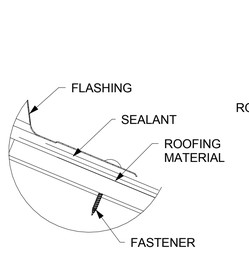


STANDING SEAM MTL. ROOF CRICKET 2

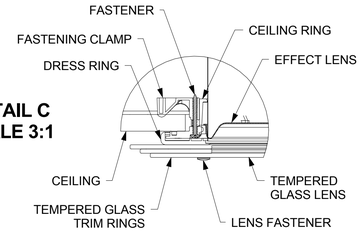
NTS



DETAIL A SCALE 3:1



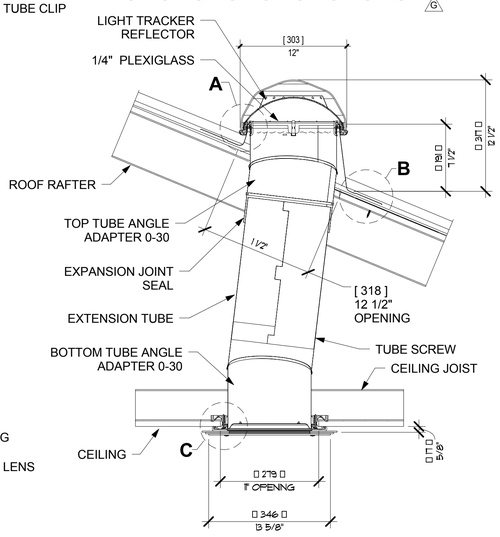
DETAIL B SCALE 3:1



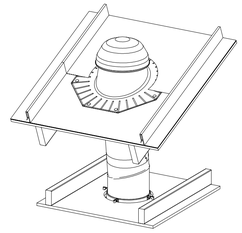
DETAIL C SCALE 3:1

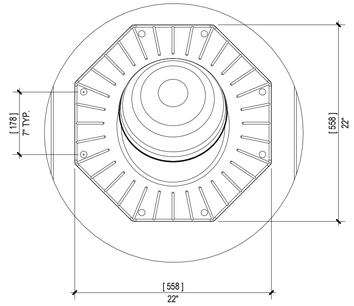
SOLATUBE 750 DS-C (21 IN / 250 MM) PITCHE SELF-FLASHING HARD CEILING W/ TIER DROP

G



FULL SECTION SCALE 1:1





TOP VIEW

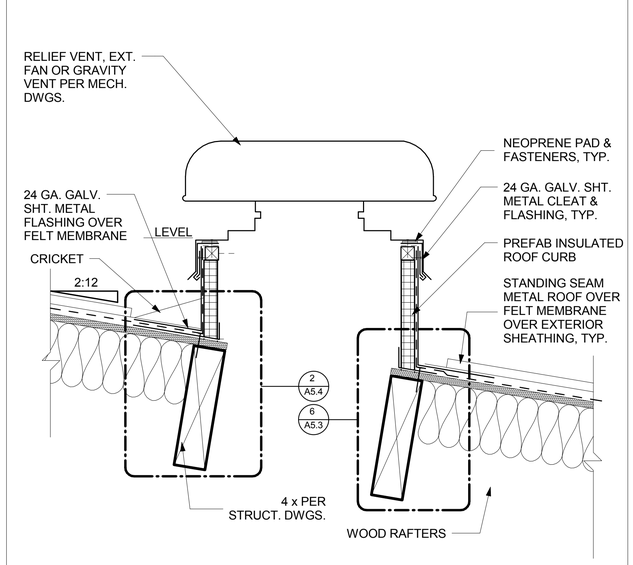
G

NOTES:

1. STRUCTURAL ELEMENTS (PLYWOOD, RAFTERS, DRYWALL ETC. BY OTHERS & SHOWN FOR REFERENCE ONLY.
2. ALL TUBE JOINTS & SEAM TAPED WITH 2" FOIL TAPE (NOT SHOWN).
3. DIMENSIONS IN CRICKETS ARE METRIC UNLESS OTHERWISE SPECIFIES
4. 6" MIN. CLEARANCE SHOULD BE MAINTAINED FROM ALL SOLATUBE COMPONENTS AND OTHER PLENUM COMPONENTS.
5. ICC EVALUATION ESR-2253
6. PROVIDE SUPPLEMENTAL 1-1/2" COLD ROLLED CHANNELS AT LAY IN CEILINGS AS REQUIRED

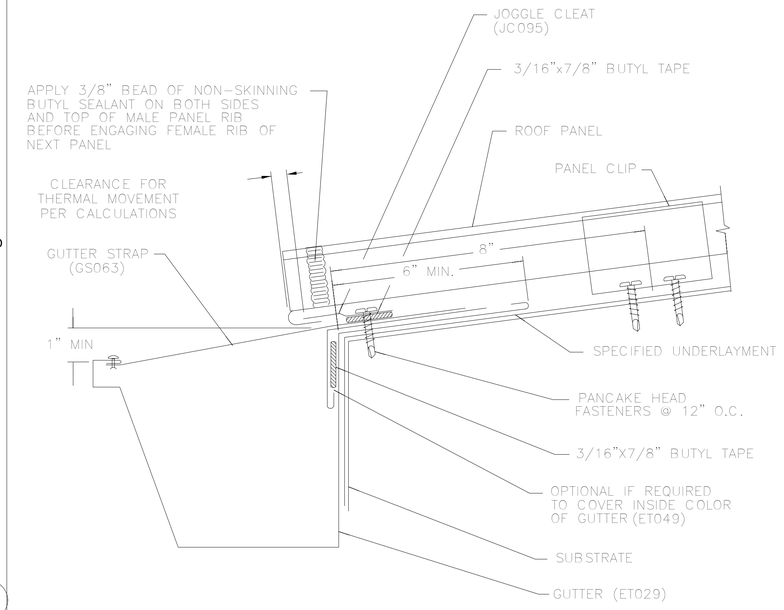
SOLAR TUBE 1

NTS



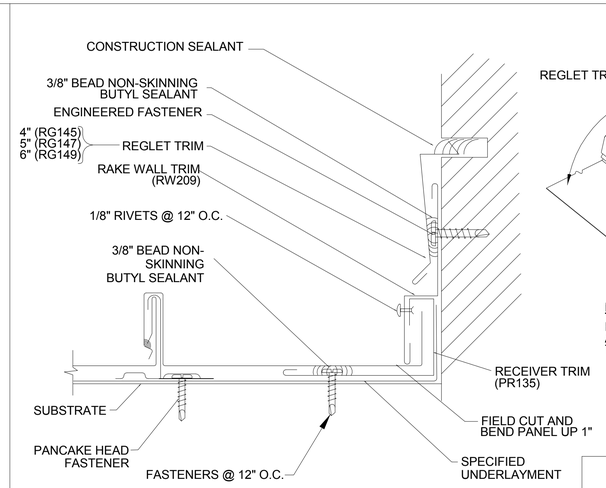
RELIEF VENT ON ROOF CURB 5

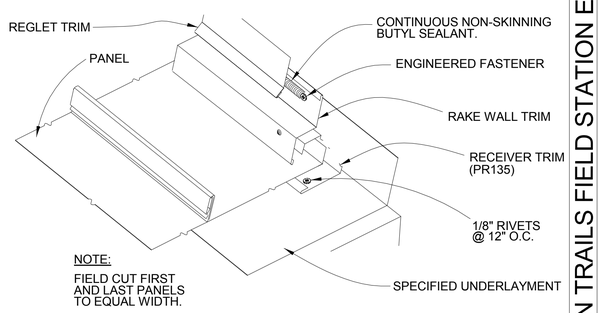
1 1/2" = 1'-0"



STANDING SEAM MTL. ROOF EAVE - WITH GUTTER 4

NTS





NOTE:
FIELD CUT FIRST AND LAST PANELS TO EQUAL WIDTH.

STANDING SEAM MTL. ROOF @ SIDE WALL 3

NTS

A5.4

PLANS FOR THE CONSTRUCTION OF MISSION TRAILS FIELD STATION EAST FORTUNA

ROOF DETAILS

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING

0 1/2 1

IF THIS BAR DOES NOT MEASURE 1" THEN THE DRAWING IS NOT TO SCALE

The City of SAN DIEGO Public Works

CONSULTANT

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ERIC H. DAVY #C014128 REGISTERED ARCHITECT STATE OF CALIFORNIA EXPIRES AUGUST 31, 2019

SPEC. NO.

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 37 OF 123 SHEETS

APPROVED
FOR CITY ENGINEER — 9/12/2017 DATE
JASON GRANI — RCE#
PRINT DCE NAME

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL			08/31/2017	
G ADDENDUM G			03/23/2018	

CONTRACTOR _____ DATE STARTED _____

INSPECTOR _____ DATE COMPLETED _____

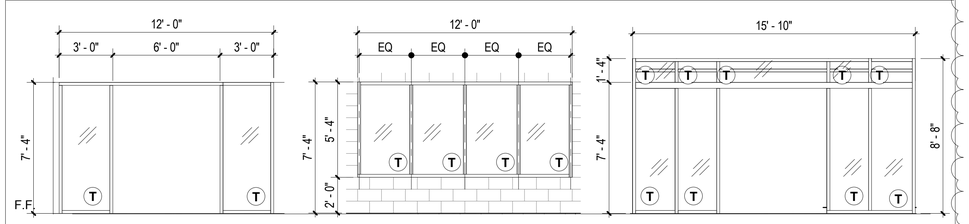
WBS	S-14016
JORGE ACEVEDO	PROJECT MANAGER
MARLON PEREZ	PROJECT ENGINEER
246-1761	CCS27 COORDINATE
1889-6321	CCS83 COORDINATE
39038 - 37 - D	

G SOLAR TUBE DETAILS

ADDENDUM G

MISSION TRAILS FIELD STATION EAST FORTUNA

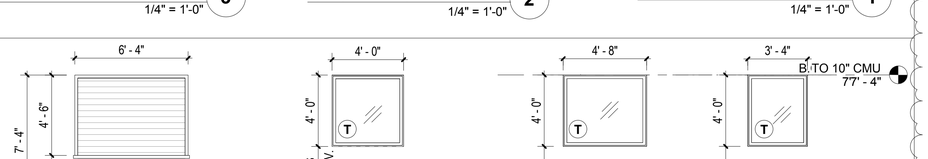
STOREFRONT & WINDOW TYPES



STOREFRONT TYPE 3 (3) 1/4" = 1'-0"

STOREFRONT TYPE 2 (2) 1/4" = 1'-0"

STOREFRONT TYPE 1 (1) 1/4" = 1'-0"

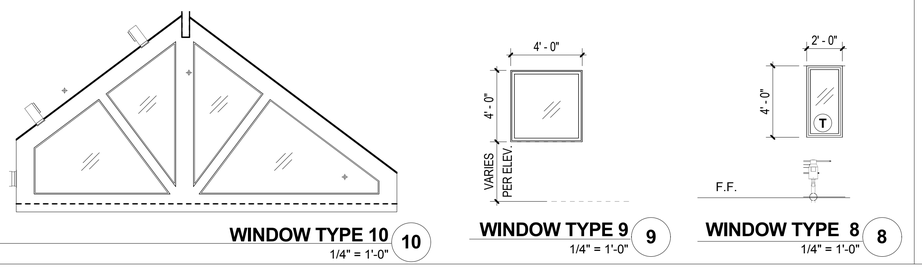


WINDOW TYPE 7 (7) 1/4" = 1'-0"

WINDOW TYPE 6 (6) 1/4" = 1'-0"

WINDOW TYPE 5 (5) 1/4" = 1'-0"

WINDOW TYPE 4 (4) 1/4" = 1'-0"



WINDOW TYPE 10 (10) 1/4" = 1'-0"

WINDOW TYPE 9 (9) 1/4" = 1'-0"

WINDOW TYPE 8 (8) 1/4" = 1'-0"

STOREFRONT & WINDOW SCHEDULE

TYPE	OVERALL DIMENSIONS WIDTH	OVERALL DIMENSIONS HEIGHT	FRAME MAT.	FRAME FIN.	DETAILS HEAD	DETAILS JAMB	DETAILS SILL	GLASS TYPE	FIRE RATING	NOTES
1	15' - 8"	9' - 0"	AL	FAC	10/A6.1	11/A6.1	12/A6.1	G-1		1,3,9
2	12' - 0"	5' - 4"	AL	FAC	10/A6.1	11/A6.1	11/A6.1	G-1		1,3,9
3	3' - 0"	7' - 4"	AL	FAC	10/A6.1	11/A6.1	12/A6.1	G-1		1,3,8,9
4	3' - 4"	4' - 0"	AL	FAC	10/A6.1	11/A6.1	11/A6.1	G-1		1,3,9
5	4' - 8"	4' - 0"	AL	FAC	10/A6.1	11/A6.1	11/A6.1	G-1		1,3,9
6	4' - 0"	4' - 0"	AL	FAC	10/A6.1	11/A6.1	11/A6.1	G-1		1,3,9
7	6' - 4"	4' - 6"	AL	FAC	14/A6.2					7,3,9
8	2' - 0"	4' - 0"	AL	FAC	10/A6.1	11/A6.1	11/A6.1	G-1		1,3,9
9	4' - 0"	4' - 0"	AL	FAC	5/A6.2	4/A6.2	6/A6.2	G-1		1,3,4,5,6,8,9
10	VARIES	VARIES	AL	FAC	6/A8.4	6/A8.4	6/A8.4	G-1		1,3,9

STOREFRONT & WINDOW SCHEDULE NOTES:

1. TEMPERED GLASS (T)
2. PASS THRU WINDOW
3. DUAL PANE GLASS
4. DORMER WINDOW; CENTER WINDOW ON WALL
5. WINDOW SILL SHALL BE 12'-6" AT OFFICE/EQUIPMENT AND 17'-6" AT DORMER
6. FIRE RATED WINDOW @ SR. RANGER OFFICE.
7. ROLL-DOWN COUNTER DOOR
8. LAMINATED GLASS AND FILM AT WEST FACING WINDOWS
9. FACTORY FINISHED AND POWDER COATED TO MATCH EXISTING VISITOR CENTER

LEGENDS & ABBREVIATIONS

AL	ALUMINUM	MTL	METAL
FAC	FACTORY FINISHED ANODIZED CLEAR	P	FACTORY PRIMED, PAINT, SEMI-GLOSS
FIN	FINISH	S	TRANSPARENT FINISH
GL-1	PPG SOLARBAN 60 CLEAR	THICK	THICKNESS
GL-2	PPG CLEAR	WD	WOOD
HM	HOLLOW METAL		
MAT	MATERIAL		

GENERAL NOTES:

1. ALL METAL AND MESH TO BE GALVANIZED HOT DIP.
2. LEVER OR PULL LATCH ADA COMPLIANT, SHALL HAVE NO TIGHT GRASPING, PINCHING OR TWISTING TO OPERATE AND SHALL HAVE A 5 LBS. MAX. OPERATING FORCE. ALL SHARP EDGES, INCLUDING BOLTS AND SCREWS TO BE GRINDED SMOOTH.
3. ALL EGRESS DOORS SHALL BE READILY OPERABLE FROM THE EGRESS SIDE WITHOUT THE USE OF A KEY OR SPECIAL KNOWLEDGE OR EFFORT OR WITHOUT REQUIRING THE ABILITY TO GRASP THE OPRNING HARDWARE (SECTION 1008.1.8).
4. ANY DOOR THAT IS PART OF EXIT SYSTEM IS TO BE PROVIDED WITH A TACTILE EXIT SIGN MOUNTED IN ACCORDANCE WITH DETAIL 9/A9.3
5. ALL ACCESSIBLE ENTRANCES SHALL BE IDENTIFIED WITH A MINIMUM OF ONE INTERNATIONAL SYMBOL OF ACCESSIBLITY TO BE VISIBLE TO PERSON ALONG APPROACHING CIRCULATION PATHS.
6. PROVIDE CONTINUOUS BACKER ROD AND SEALANT AROUND PERIMETER OF ALL STOREFRONT AND FIXED WINDOWS (INTERIOR & EXTERIOR)
7. GLAZING SHALL BE TEMPERED SAFETY GLASS, U.O.N.
8. GLAZING SHGC SHALL MEET OR BE BELOW THE VALUE MODELED IN THE CALCULATIONS (SEE MECHANICAL DRAWINGS)
9. ALL HOLLOW METAL DOORS WILL BE 16GA EXTERIOR, 18GA INTERIOR. DOORS WILL BE HONEYCOMB CORE, FULL EDGE SEAM WELDED WITH SEALED TOPS, PER FACILITIES DIVISION STANDARDS AND SPECIFICATIONS GUIDELINE DIV. 8.1A.
10. GLAZING: U-FACTOR 0.29(WINTER NIGHT) 0.27(SUMMER DAY), SHGC 0.39, VT 0.70
11. WHERE GLAZED OPENINGS ARE PROVIDED IN ACCESSIBLE ROOMS OR SPACES FOR OPERATION BY OCCUPANTS AT LEAST ONE OPENING SHALL COMPLY.

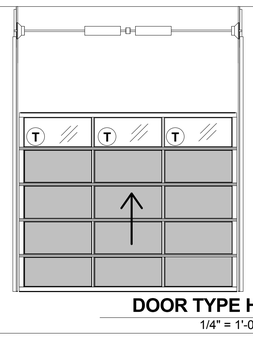
DOOR & GATE SCHEDULE

DOOR NO.	DOOR TYPE	DIMENSIONS DIM. WIDTH	DIM. HEIGHT	DIM. THICK	DOOR MAT.	DOOR FIN.	FRAME MAT.	FRAME FIN.	GLASS	PANIC DEVICE	HARDWARE SET	DOOR HEAD	DOOR JAMB	DOOR SILL	NOTES
100	A	6' - 0"	7' - 0"	0' - 1 3/4"		AL	-	-	GL-1	YES	001	8/A6.1	8/A6.1	9/A6.1	4,7
101A	A	6' - 0"	7' - 2"	0' - 1 3/4"		AL	-	-	GL-1		001	7/A6.1	8/A6.1	9/A6.1	4,9
101B	A	6' - 0"	7' - 2"	0' - 1 3/4"		AL	-	-	GL-1		001	7/A6.1	8/A6.1	9/A6.1	4,9
101C	F	3' - 0"	7' - 0"	0' - 1 3/4"		HM	HM		-		002	4/A6.1	5/A6.1	3/A6.1	
102A	A	6' - 0"	7' - 2"	0' - 1 3/4"		AL	-	-	GL-1		012	7/A6.1	8/A6.1	9/A6.1	4,9
102B	D	6' - 4"	7' - 0"	0' - 1 3/4"	SC	HM	HM	P	-		013	4/A6.1	5/A6.1	3/A6.1	
103A	F	3' - 0"	7' - 0"	0' - 1 3/4"	SC	HM	HM		-	YES	009	1/A6.1	2/A6.1	3/A6.2	
103B	E	3' - 0"	7' - 0"	0' - 1 3/4"	SC	WD	HM	P	-		004	4/A6.1	5/A6.1	3/A6.1	
104	E	3' - 0"	7' - 0"	0' - 1 3/4"	SC	WD	HM	P	-		005	4/A6.1	5/A6.1	3/A6.1	3
105	E	3' - 0"	7' - 0"	0' - 1 3/4"	SC	WD	HM	P	-		006	4/A6.1	5/A6.1	3/A6.1	3
106	F	3' - 0"	7' - 0"	0' - 1 3/4"	SC	HM	HM		-		008	4/A6.1	5/A6.1	3/A6.1	
107	E	3' - 0"	7' - 0"	0' - 1 3/4"	SC	WD	HM	P	-		007	4/A6.1	5/A6.1	3/A6.1	3
108	E	3' - 0"	7' - 0"	0' - 1 3/4"	-	WD	HM		GL-1		003	8/A6.2	6/A6.1	3/A6.1	4
109	F	3' - 0"	7' - 0"	0' - 1 3/4"	-	HM	HM		GL-1		014	9/A6.2	11/A6.2	3/A6.1	2,4
110	E	3' - 0"	7' - 0"	0' - 1 3/4"	SC	WD	HM		-		010	9/A6.2	11/A6.2	3/A6.1	2,3
111	E	3' - 0"	7' - 0"	0' - 1 3/4"	SC	P	TIMELY	P	-		011	4/A6.1	5/A6.1	3/A6.1	
112	E	3' - 0"	7' - 0"	0' - 1 3/4"	SC	WD	HM	P	-		006	4/A6.1	5/A6.1	3/A6.1	3
113	G	2' - 8"	7' - 0"	0' - 1 3/4"	SC	P	HM	P	-		016	9/A6.2	6/A6.1	3/A6.1	1
114	E	3' - 0"	7' - 0"	0' - 1 3/4"	SC	WD	HM	P	-		015	4/A6.1	5/A6.1	3/A6.1	1,3
115	E	3' - 0"	7' - 0"	0' - 1 3/4"	SC	WD	HM		-		017	1/A6.1	2/A6.1	3/A6.2	3
116	E	3' - 0"	7' - 0"	0' - 1 3/4"	SC	WD	HM		-		017	1/A6.1	2/A6.1	3/A6.2	3
117A	H	12' - 0"	10' - 0"	0' - 2 1/8"	-	MTL	MTL		GL-1		022	1/A6.2	2/A6.2	10/A6.2	4
117B	H	12' - 0"	10' - 0"	0' - 2 1/8"	-	MTL	MTL		GL-1		022	1/A6.2	2/A6.2	10/A6.2	4
117C	D	6' - 0"	7' - 0"	0' - 2"		AL	ALF				001	1/A6.1	2/A6.1	3/A6.2	
118	C	3' - 4"	7' - 2"	0' - 1 3/4"	-	P	HM	P	-	YES	019	1/A6.1	2/A6.1	3/A6.2	
120	D	6' - 4"	7' - 0"	0' - 1 3/4"	SC	HM	HM	P	-		018	9/A6.2	2/A6.2	3/A6.2	1,5,6
121	D	6' - 4"	8' - 0"	0' - 1 3/4"	SC	HM	HM	P	-		020	9/A6.2	2/A6.2	3/A6.2	1,5,6
S1	M	15' - 9"	3' - 6"	0' - 3"	Metal	MTL	MTL	-	-		021				
S2	K	3' - 10"	7' - 4"			MTL	MTL								8
S3	K	3' - 10"	7' - 4"			MTL	MTL				021				
S4	J	8' - 1"	6' - 0"	0' - 3"		MTL	MTL	-							
S5	J	8' - 1"	6' - 0"	0' - 3"	Metal	MTL	MTL	-	-		021				
S6	L	15' - 9"	5' - 0"	0' - 3"	Metal	MTL	MTL	-	-		022				
S7	N	30' - 0"	3' - 6"	0' - 3"								10/AS0.2	10/AS0.2	10/AS0.2	
S8	K	3' - 10"	6' - 0"	0' - 3"	Metal	-	-	-	-				2/A6.2		

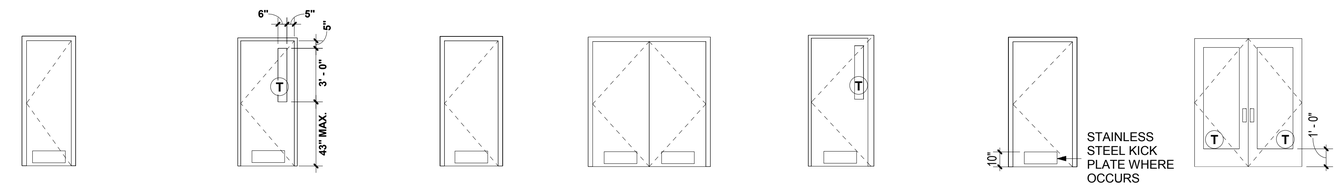
DOOR & GATE SCHEDULE NOTES:

1. PROVIDE METAL LOUVER AT DOOR
2. FIRE RATED DOOR
3. UNDERCUT DOORS
4. GLAZING IN DOORS SHALL BE TEMPERED
5. PROVIDE RAIN DRIP SCREEN AT HEAD
6. 4" HEAD FRAME WITH 2" JAMB
7. PROVIDE READILY VISIBLE DURABLE SIGN POSTED ON THE EGRESS SIDE ON OR ADJACENT TO THE DOOR STATING: "THIS DOOR TO REMAIN UNLOCKED WHEN BUILDING IS OCCUPIED". THE LETTERS ARE 1" HIGH ON A CONTRASTING BACKGROUND.
8. 10" x 3/16" KICKPLATE TO BE INSTALLED ON OUTSIDE OF GATE FRAME, NOT INSIDE 10" SMOOTH SURFACE - TO BE PROVIDED WIDTH OF ENTIRE GATE PER CBC 11B-404.2.10
9. LAMINATED GLASS AND FILM AT WEST FACING DOORS

DOOR & GATE TYPES



DOOR TYPE H (H) 1/4" = 1'-0"



DOOR TYPE G (G) 1/4" = 1'-0"

DOOR TYPE F (F) 1/4" = 1'-0"

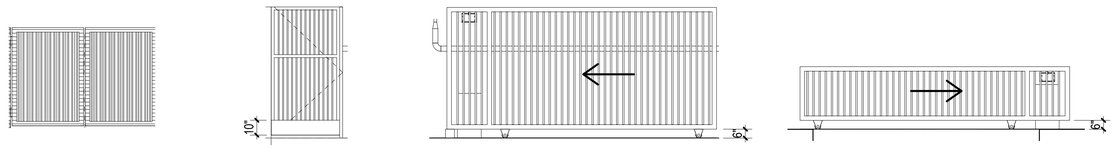
DOOR TYPE E (E) 1/4" = 1'-0"

DOOR TYPE D (D) 1/4" = 1'-0"

DOOR TYPE C (C) 1/4" = 1'-0"

DOOR TYPE B (B) 1/4" = 1'-0"

DOOR TYPE A (A) 1/4" = 1'-0"

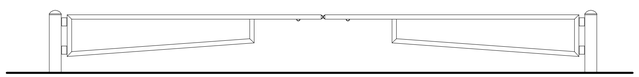


GATE TYPE J (J) 1/4" = 1'-0"

GATE TYPE K (K) 1/4" = 1'-0"

SLIDING GATE TYPE L (L) 1/4" = 1'-0"

SLIDING GATE TYPE M (M) 1/4" = 1'-0"



SWING TRAFFIC GATE (N) 1/4" = 1'-0"

A6.0

PLANS FOR THE CONSTRUCTION OF MISSION TRAILS FIELD STATION EAST FORTUNA

WINDOWS AND DOORS

MISSION TRAILS FIELD STATION EAST FORTUNA

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING

0 1/2 1

IF THIS BAR DOES NOT MEASURE 1" THEN THE DRAWING IS NOT TO SCALE

The City of SAN DIEGO Public Works

CONSULTANT

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SPEC. NO.

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 39 OF 123 SHEETS

APPROVED
FOR CITY ENGINEER — DATE 9/12/2017
JASON GRANI
PRINT DCE NAME — RCE#

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL			08/31/2017	
6 ADDENDUM G			03/23/2018	

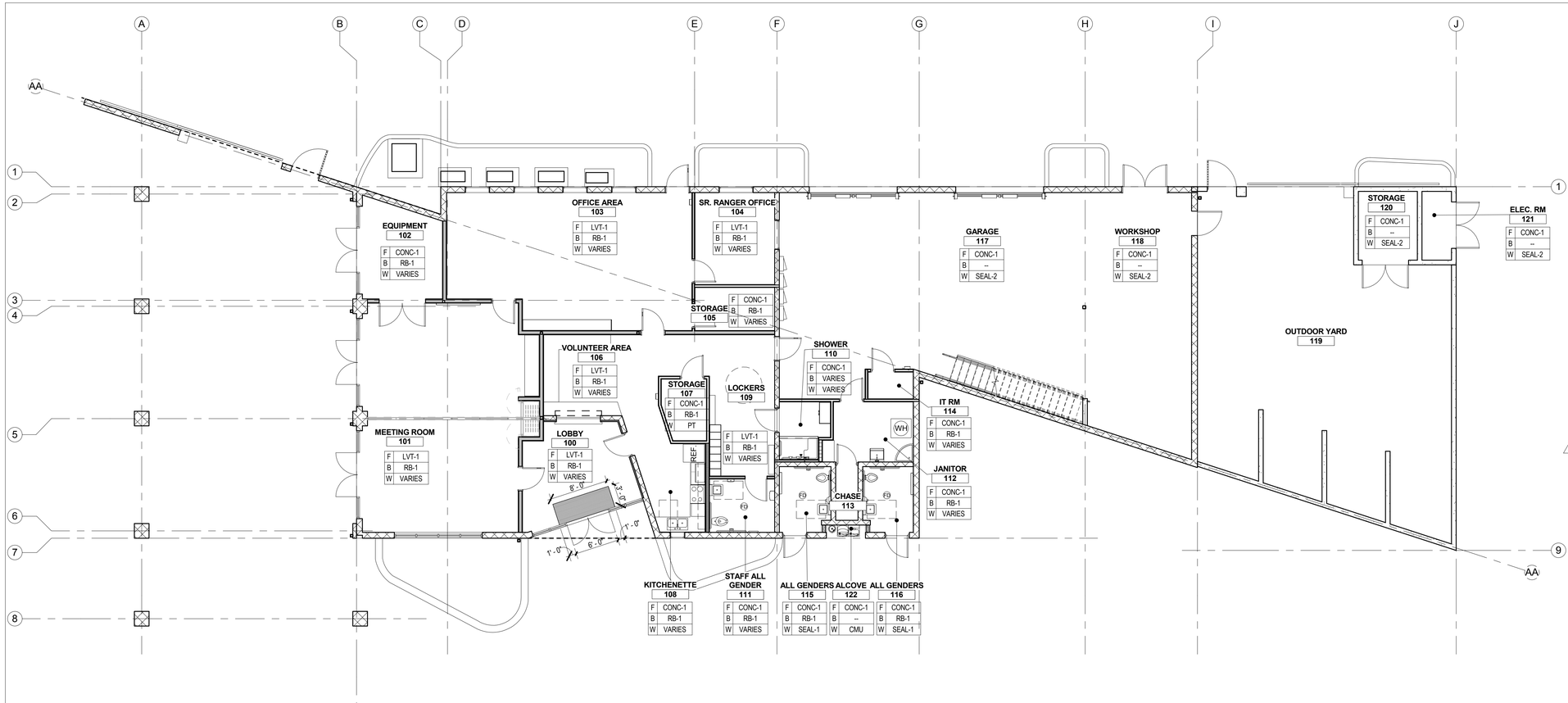
CONTRACTOR — DATE STARTED
INSPECTOR — DATE COMPLETED

WBS S-14016

JORGE ACEVEDO	PROJECT MANAGER
MARLON PEREZ	PROJECT ENGINEER
246-1761	CCS27 COORDINATE
1889-6321	CCS83 COORDINATE
39038 - 39 - D	

6 WINDOW SCHEDULE
Page 21 of 25

ADDENDUM G



FINISH NOTES:

1. USE MOISTURE/MOLD RESISTANT GYPSUM BOARD THAT SATISFIES ASTM C473 FOR WATER RESISTANCE AND ASTM G21 FOR MOLD RESISTANCE AT ALL WET WALLS.
2. VARIED CEILING HEIGHTS; SEE BUILDING SECTIONS SHEET 4.0.
3. ALL EXPOSED WOOD ON MILWORK TO BE PAINTED TO MATCH MOST IMMEDIATE ADJACENT WALL SURFACE.
4. PROVIDE MINIMUM LEVEL 3 SMOOTH FINISH ON GYPSUM BOARD, U.O.N.
5. 12 GA ALUMINUM DIAMOND EMBOSSED (NON SKID SURFACE) TREAD FLOORING OVER 20 GA CORRUGATED STEEL DECK (MATTE FINISH)- DIAMOND PLATE TO BE "DIAMONDLIFE" OR APPROVED EQUAL. PRIME 1/2" PLYWOOD SUBSTRATE AND USE 3M 94CA ADHESIVE.
6. ALL WALL SHALL BE REINFORCED, SOLID GROUTED CONCRETE BLOCK MASONRY WALL
7. ALL WALL SHALL BE TREATED WITH ANTI GRAFFITI COATING INSIDE AND OUTSIDE, INCLUDING CEILING @ PUBLIC UNISEX RESTROOMS.
8. WHERE RUBBER BASE MEETS CMU WALLS, PROVIDE CAULK AT CONCAVE JOINTS AT TOP OF RUBBER BASE.
9. ALL EXPOSED SIMPSON HARDWARE/CONNECTORS TO BE PAINTED.
10. SEE PAINT LEGEND IN SPECIFICATION BOOK FOR PAINT COLORS AND LOCATIONS.
11. TONGUE AND GROOVE CEILING AND EXPOSED JOISTS TO BE STAINED.

FINISH MATERIAL LEGEND

ACT	ACOUSTIC CEILING GRID AND TILE, 2'-0" x 2'-0" ARMSTRONG - FINE FISSURED
ASPH	ASPHALT
CONC-1	CONCRETE, POLYURETHANE SEALER
CTN	CURTAIN WALL, SEE STOREFRONT SCHEDULE
CMU	CONCRETE MASONRY UNIT
GB	GLASS BLOCK
EXP	EXPOSED TO STRUCTURE
GYP	GYPSUM BOARD, LIGHT TEXTURE
LVT -1	LUXURY VINYL TILE - SHAW STRAND 0516V - CHALK 16515, 18"X36"
MTL	METAL CORRUGATED DECK
TBD	TO BE DETERMINED
TG	TONGUE & GROOVE - NOMINAL 1 X 6 BEVELED GORMAN PINE - TO BE STAINED
PCC	PORTLAND CEMENT CONCRETE
Q	QUARTZ COUNTERTOP
RB-1	RUBBER BASE - JOHNSONITE 6" COVE BASE, TA8 WELSH CASTLE
SC	SEALED CONCRETE BASE
VAR	VARIES

FINISH LEGEND

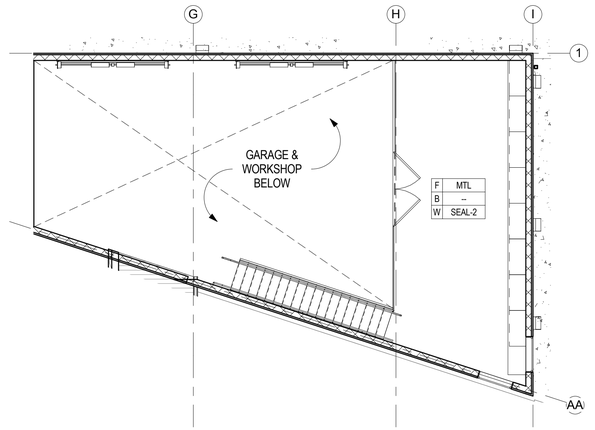
EXPY	EXPOXY SEALER-CLEAR
FAC	FACTORY FINISH
FS	FLAT SHEEN PAINT
DG	DESCO GLAZETITE (SEALANT-ICBO APPROVED)
LS	LOW SHEEN PAINT
PM	PER MANUFACTURER
POLY	POLYRETHANES SEALER - CLEAR
SGL	SEMI-GLOSS PAINT
UN	UNFISNISHED/UNTREAT

COLOR LEGEND

NOTE: MANUFACTURERS AND PRODUCT NUMBERS ARE PROVIDED AS A BASIS OF DESIGN.

CLRS	CLEAR SEALER
WH	WHITE

FIRST FLOOR FINISH PLAN 1
1/8" = 1'-0"



MEZZANINE FINISH PLAN 2
1/8" = 1'-0"

FINISHES

ROOM	NAME	FLOOR MAT	FLOOR COL	BASE MAT	BASE COL	NORTH MAT	NORTH FIN	NORTH COL	EAST MAT	EAST FIN	EAST COL	SOUTH MAT	SOUTH FIN	SOUTH COL	WEST MAT	WEST FIN	WEST COL	CEILING MAT	CEILING FIN	CEILING COL	CEILING HEIGHT	NOTES
100	LOBBY	LVT-1	-	RB-1	-	CMU	-	-	CMU	-	-	CTN	-	-	GYP	LS	-	GYP	SGL	WH	VARIES	3,10
101	MEETING ROOM	LVT-1	-	RB-1	-	GYP	LS	-	GYP	LS	-	CMU	-	-	CMU	-	-	TG	-	-	VARIES	3,10
102	EQUIPMENT	CON-1	-	RB-1	-	CMU	LS	-	GYP	LS	-	GYP	LS	-	CMU	-	-	TG	-	-	VARIES	3,10
103	OFFICE AREA	LVT-1	-	RB-1	-	CMU	LS	-	GYP	LS	-	GYP	LS	-	GYP	LS	-	TG	-	-	VARIES	3,10
104	SR. RANGER OFFICE	LVT-1	-	RB-1	-	CMU	LS	-	CMU	LS	-	GYP	LS	-	GYP	LS	-	ACT	FAC	WH	9' -0"	4,10
105	STORAGE	CON-1	-	RB-1	-	GYP	LS	-	CMU	LS	-	GYP	LS	-	GYP	LS	-	ACT	FAC	WH	10' -0"	4,10
106	VOLUNTEER AREA	LVT-1	-	RB-1	-	GYP	LS	-	GYP	LS	-	CMU	LS	-	GYP	LS	-	ACT	FAC	WH	10' -0"	4,10
107	STORAGE	CON-1	-	RB-1	-	GYP	LS	-	GYP	LS	-	GYP	LS	-	GYP	LS	-	ACT	FAC	WH	10' -0"	4,10
108	KITCHENETTE	LVT-1	-	RB-1	-	GYP	SGL	-	CMU	SGL	-	CMU	SGL	-	CMU	SGL	-	GYP	SGL	WH	10' -0"	1,10
109	LOCKERS	LVT-1	-	RB-1	-	GYP	SGL	-	CMU	SGL	-	GYP	SGL	-	GYP	SGL	-	ACT	FAC	WH	10' -0"	4,10
110	SHOWER	CON-1	-	SC	-	GYP	SGL	-	GYP	SGL	-	CMU	SGL	-	CMU	SGL	-	GYP	SGL	WH	10' -0"	1,10
111	STAFF ALL GENDER	CON-1	-	SC	-	GYP	SGL	-	CMU	SGL	-	CMU	SGL	-	CMU	SGL	-	ACT	FAC	WH	10' -0"	1,10
112	JANITOR	CON-1	-	SC	-	GYP	SGL	-	CMU	SGL	-	CMU	SGL	-	GYP	SGL	-	GYP	SGL	WH	10' -0"	1,10
113	CHASE	CON-1	-	SC	-	GYP	LS	-	CMU	SGL	-	CMU	-	-	CMU	-	-	EXP	-	-	VARIES	3,10
114	IT RM	CON-1	-	SC	-	GYP	LS	-	CMU	SGL	-	GYP	LS	-	GYP	LS	-	GYP	SGL	WH	10' -0"	4,10
115	ALL GENDERS	CON-1	-	SC	-	CMU	DG	-	CMU	DG	-	CMU	DG	-	CMU	DG	-	GYP	DG	WH	10' -0"	1,6,7
116	ALL GENDERS	CON-1	-	SC	-	CMU	DG	-	CMU	DG	-	CMU	DG	-	CMU	DG	-	GYP	DG	WH	10' -0"	1,6,7
117	GARAGE	CON-1	-	RB-1	-	CMU	DG	-	CMU	DG	-	CMU	DG	-	CMU	DG	-	EXP	-	-	VARIES	3,10
118	WORKSHOP	CON-1	-	RB-1	-	CMU	DG	-	CMU	DG	-	CMU	DG	-	CMU	DG	-	EXP	-	-	VARIES	3,10
119	OUTDOOR YARD	PCC	-	-	-	CMU	DG	-	CMU	DG	-	CMU	DG	-	CMU	DG	-	EXP	-	-		6,7
120	STORAGE	CON-1	-	-	-	CMU	DG	-	CMU	-DG	-	CMU	DG	-	CMU	DG	-	EXP	-	-	9' -0"	6,7
121	ELEC. RM	CON-1	-	-	-	CMU	DG	-	CMU	DG	-	CMU	DG	-	CMU	DG	-	EXP	-	-	9' -0"	6,7
122	ALCOVE					CMU	DG	-			-											
200	MEZZANINE	MTL		-		CMU	DG	-	-	-	-	CMU	DG	-	CMU	DG	-	EXP	-	-	VARIES	5

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN THE DRAWING IS NOT TO SCALE

The City of SAN DIEGO Public Works

CONSULTANT
DAVY ARCHITECTURE
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ERIC H. DAVY #C014128 ARCHITECT EXPIRES AUGUST 31, 2019 STATE OF CALIFORNIA

SPEC. NO.

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 42 OF 123 SHEETS

APPROVED
FOR CITY ENGINEER — 9/12/2017 DATE
JASON GRANI — RCE#
PRINT DCE NAME

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL			08/31/2017	
G ADDENDUM G			03/23/2018	

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____
G FINISH NOTES

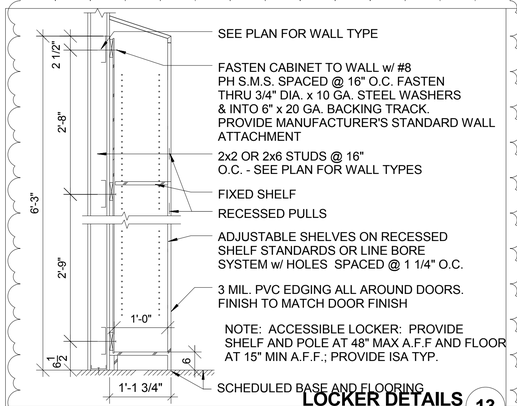
WBS S-14016
JORGE ACEVEDO — PROJECT MANAGER
MARLON PEREZ — PROJECT ENGINEER
246-1761
CCS27 COORDINATE
1889-6321
CCS83 COORDINATE
39038 - 42 - D

A7.0

PLANS FOR THE CONSTRUCTION OF MISSION TRAILS FIELD STATION EAST FORTUNA

FIRST FLOOR FINISH PLAN

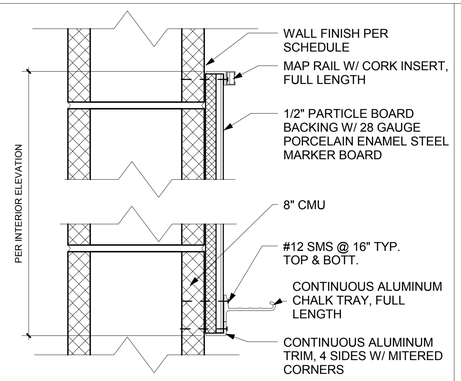
MISSION TRAILS FIELD STATION EAST FORTUNA



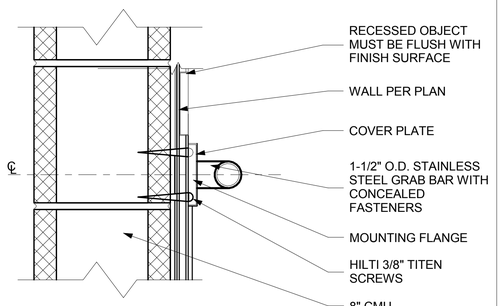
LOCKER DETAILS 13
3/4" = 1'-0"

G

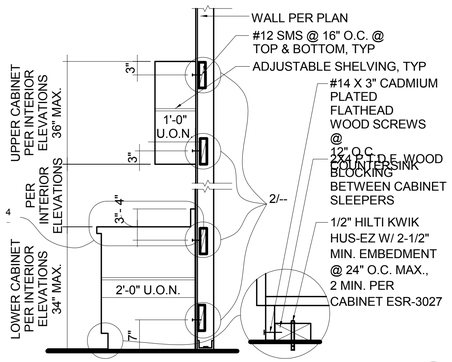
NOT USED



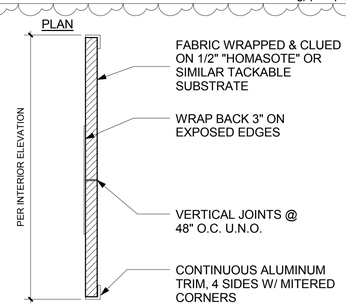
MARKER BOARD MOUNTING @ CMU WALL 7
3" = 1'-0"



GRAB BAR CONNECTION 4
3" = 1'-0"



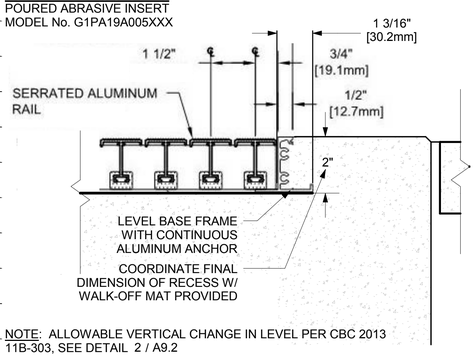
UPPER & LOWER CASEWORK CABINETS 1
3/4" = 1'-0"



FOR ANCHORAGE SEE 7 / A9.0 AND - / ---

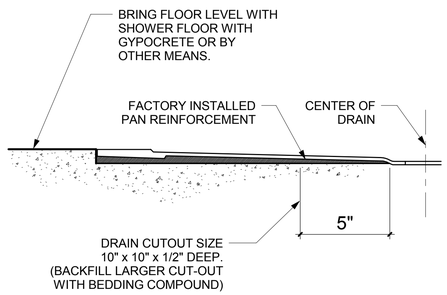
FABRIC COVERED TACKABLE WALL PANEL 14
3" = 1'-0"

RONICK MATTING SYSTEMS
POURED ABRASIVE INSERT
MODEL No. G1PA19A005XXX

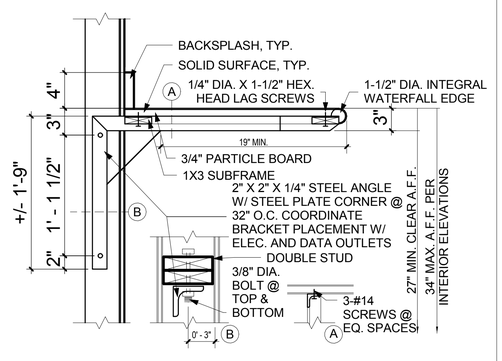


NOTE: ALLOWABLE VERTICAL CHANGE IN LEVEL PER CBC 2013 11B-303, SEE DETAIL 2 / A9.2

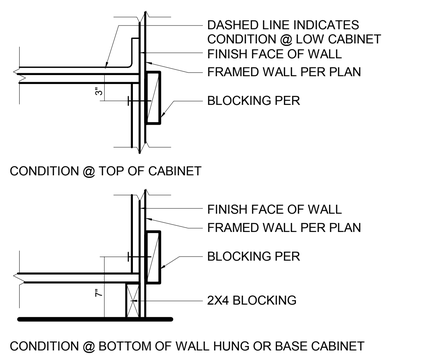
WALK- OFF MAT 11
6" = 1'-0"



THRESHOLD @ SHOWER 8
3" = 1'-0"



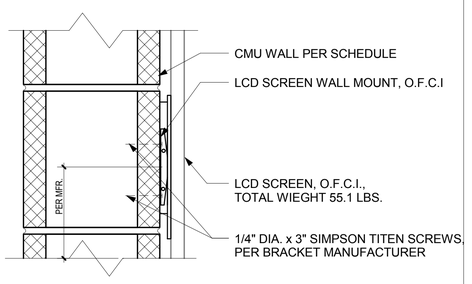
SOLID COUNTERTOP & SUPPORT 5
1 1/2" = 1'-0"



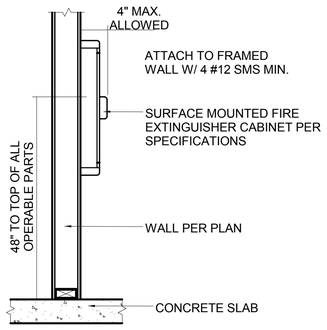
CABINET ANCHORAGE 2
1 1/2" = 1'-0"

NOT USED

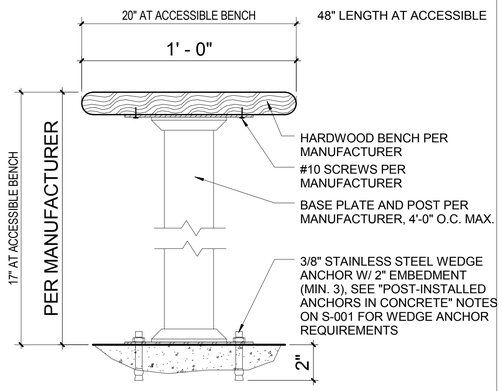
G



LCD SCREEN ANCHORAGE 12
3" = 1'-0"

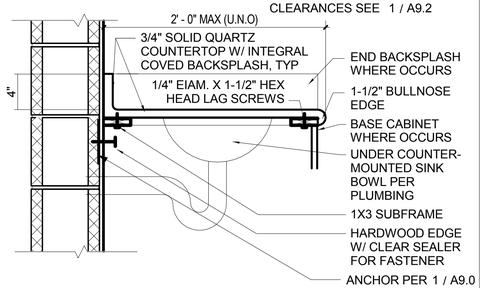


SURFACE MOUNTED FIRE EXTING. CABINET 9
1" = 1'-0"



LOCKER BENCH 6
3" = 1'-0"

NOTE: NO SHARP OR ABRASIVE SURFACES IN KNEE CLEAR SPACE. MAX. COUNTER HEIGHT 34" A.F.F.
FOR ACCESSIBLE SINK CLEARANCES SEE 1 / A9.2



FOR LOCATIONS WHERE BASE CABINET DOES NOT OCCUR SEE 5 / A9.0

SOLID QUARTZ COUNTERTOP 3
1 1/2" = 1'-0"

A9.0

AS-BUILT INFORMATION

MATERIALS	MANUFACTURER

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING
0 1/2 1
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The City of SAN DIEGO Public Works

CONSULTANT

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PHONE 619.238.3811
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SPEC. NO.

ERIC H. DAVY #C014152 ARCHITECT EXPIRES AUGUST 31, 2019 STATE OF CALIFORNIA

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 48 OF 123 SHEETS

APPROVED
FOR CITY ENGINEER — 9/12/2017 DATE
JASON GRANI
PRINT DCE NAME — RCE#

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL			08/31/2017	
G ADDENDUM G			03/23/2018	

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

PLANS FOR THE CONSTRUCTION OF MISSION TRAILS FIELD STATION EAST FORTUNA

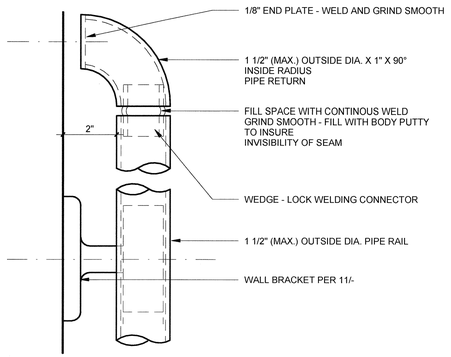
CASEWORK & MISC. DETAILS

WBS S-14016
JORGE ACEVEDO — PROJECT MANAGER
MARLON PEREZ — PROJECT ENGINEER
246-1761
CCS27 COORDINATE
1889-6321
CCS83 COORDINATE
39038 - 48 - D

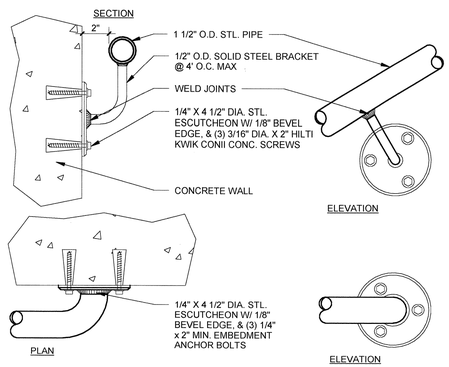
G LOCKER BACKING & ROLL OFF MATT

ADDENDUM G

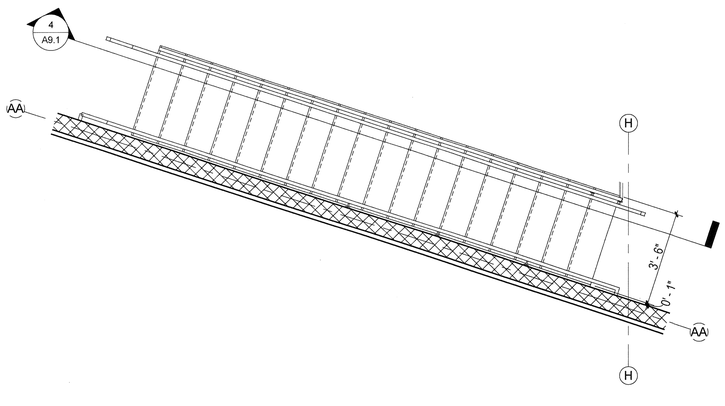
MISSION TRAILS FIELD STATION EAST FORTUNA



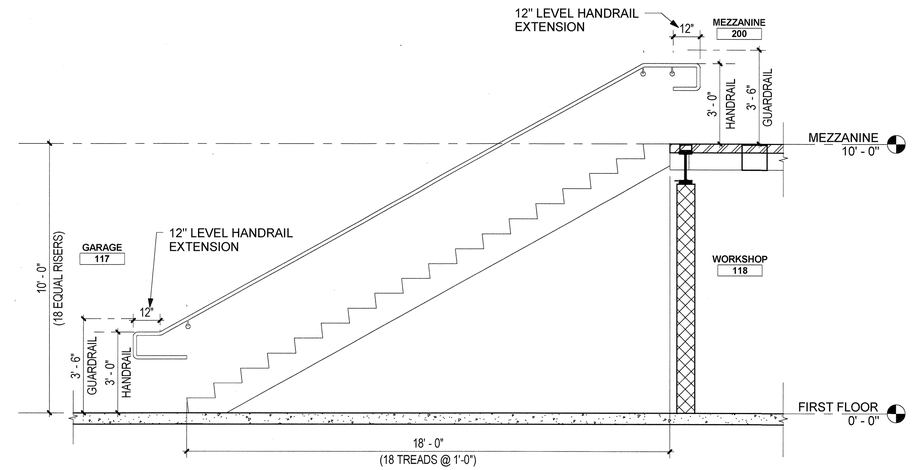
WALL MOUNTED HANDRAIL 1
6" = 1'-0"



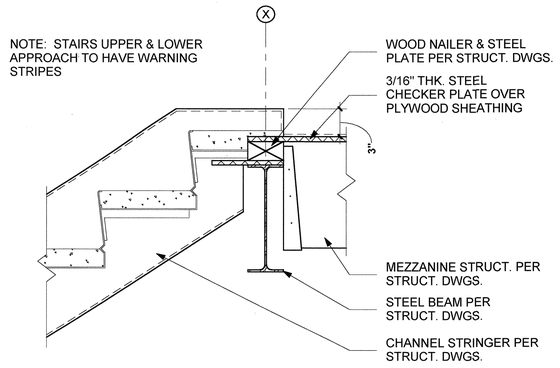
WALL MOUNTED HANDRAIL DETAIL 2
3" = 1'-0"



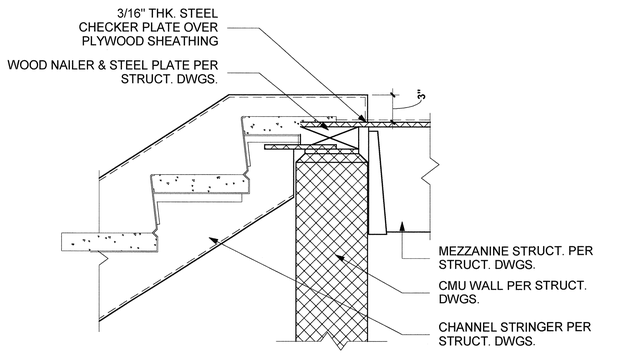
MEZZANINE STAIR PLAN 6
3/8" = 1'-0"



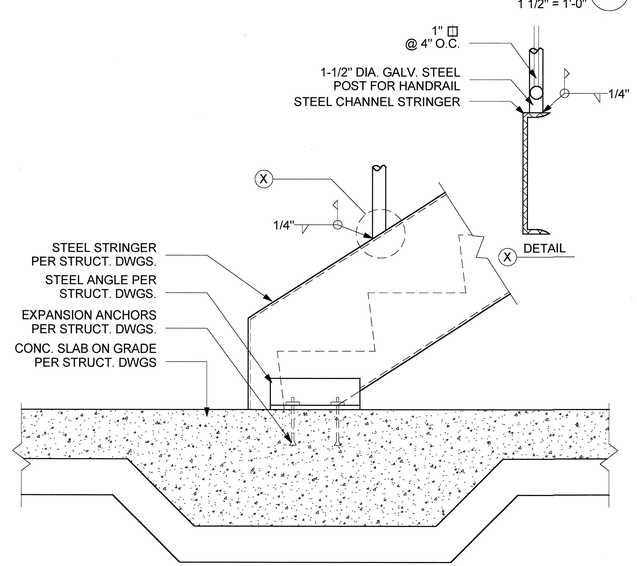
STAIR SECTION 4
3/8" = 1'-0"



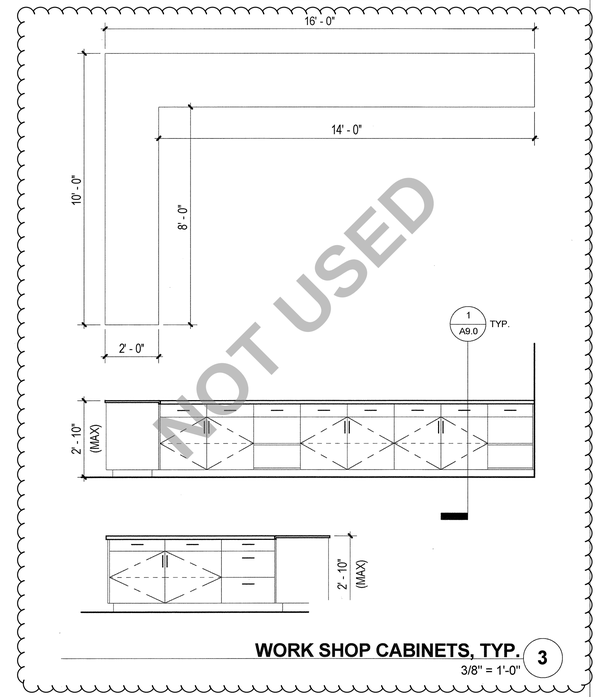
STAIR LANDING @ MEZZANINE 8
1 1/2" = 1'-0"



STAIR LANDING @ CMU 7
1 1/2" = 1'-0"

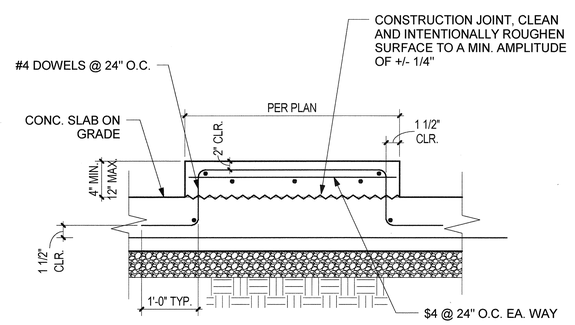


STAIR @ LANDING 9
1 1/2" = 1'-0"



WORK SHOP CABINETS, TYP. 3
3/8" = 1'-0"

G



NOTE:
1. PROVIDE INSERTS AS REQUIRED BY MECHANICAL DRAWINGS

CONCRETE PAD 5
1 1/2" = 1'-0"

A9.1

MISSION TRAILS FIELD STATION EAST FORTUNA

PLANS FOR THE CONSTRUCTION OF MISSION TRAILS FIELD STATION EAST FORTUNA

STAIR DETAILS & MISC. CASEWORK

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING
0 1/2 1
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The City of SAN DIEGO Public Works

CONSULTANT

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SPEC. NO.

ERIC DAVY #C31413 REGISTERED ARCHITECT EXPIRES AUGUST 31, 2019 STATE OF CALIFORNIA

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 49 OF 123 SHEETS

APPROVED
FOR CITY ENGINEER — 9/12/2017 DATE
JASON GRANI
PRINT DCE NAME — RCE#

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL			02/28/2017	
G ADDENDUM G			03/23/2018	

CONTRACTOR — DATE STARTED
INSPECTOR — DATE COMPLETED

WBS	S-14016
JORGE ACEVEDO	PROJECT MANAGER
MARLON PEREZ	PROJECT ENGINEER
246-1761	
CCS27 COORDINATE	
1889-6321	
CCS83 COORDINATE	
39038 - 49 - D	

A9.1

SIGNAGE NOTES

1. CHARACTER TYPE: RAISED CHARACTERS ON SIGNS SHALL BE 1/32 INCH (0.8mm) MINIMUM ABOVE THEIR BACKGROUND, SANS SERIF UPPER CASE. RAISED CHARACTERS SHALL BE DUPLICATED IN BRAILLE COMPLYING WITH CBC SECTION 11B-703.3

2. CHARACTER SIZE & SPACING: RAISED CHARACTERS SHALL BE 5/8 INCH (15.9mm) MINIMUM AND 2 INCHES (51mm) MAXIMUM. SPACING BETWEEN INDIVIDUAL TACTILE CHARACTERS SHALL COMPLY WITH CBC SECTIONS 11B-703.4 AND 11B-703.6.

3. FINISH AND CONTRAST: CONTRAST BETWEEN CHARACTERS, SYMBOLS AND THEIR BACKGROUND MUST BE 70% MINIMUM AND HAVE A NON-GLARE FINISH PER CBC SECTION 11B-703.5.1.

4. PROPORTIONS: CHARACTERS ON SIGNS SHALL HAVE A WIDTH-TO-HEIGHT RATIO OF BETWEEN 3:5 AND 1:1 AND A STROKE WIDTH-TO-HEIGHT RATIO OF BETWEEN 1:5 AND 1:10. CBC SECTION 11B-703.2.4. ALL LETTERS MEASURED MUST BE UPPERCASE. AFTER CHOOSING A TYPESTYLE TO TEST, BEGIN BY PRINTING THE LETTERS I, X, AND O AT 1 INCH HIGH. PLACE THE TEMPLATE'S 1:1 SQUARE OVER THE X OR O, WHICHEVER IS NARROWER. IF THE CHARACTER IS NOT WIDER THAN 1 INCH, NOR NARROWER THAN THE 3:5 RECTANGLE, THE PROPORTIONS ARE CORRECT. USE THE 1:5 RECTANGLE TO DETERMINE IF THE STROKE OF THE I IS TOO BROAD, AND THE 1:10 RECTANGLE TO SEE IF IT IS TOO NARROW. IF ALL THE TESTS ARE PASSED, THE TYPESTYLE IS COMPLIANT WITH PROPORTION REQUIREMENT.
   1. RAISED CHARACTERS ON SIGNS SHALL BE SELECTED FROM FONTS WHERE THE WIDTH OF THE UPPERCASE LETTER "O" IS 60% MINIMUM AND 110% MAXIMUM OF THE HEIGHT OF THE UPPERCASE LETTER "L". CBC SECTION 11B-703.5.4.
   2. STROKE THICKNESS OF THE UPPERCASE LETTER "L" SHALL BE 10% MINIMUM AND 20% MAXIMUM OF THE HEIGHT OF THE CHARACTER. CBC SECTION 11B-703.5.7.

5. BRAILLE: CONTRACTED (GRADE 2) BRAILLE SHALL BE USED WHEREVER BRAILLE IS REQUIRED IN OTHER PORTIONS OF THESE STANDARDS. DOTS SHALL BE 1/10 INCH (2.54 MM) ON CENTER IN EACH CELL WITH 3/10 INCH (7.6 MM) SPACE BETWEEN CELLS, MEASURED FROM THE SECOND COLUMN OF DOTS IN THE FIRST CELL TO THE FIRST COLUMN OF DOTS IN THE SECOND CELL. DOTS SHALL BE RAISED A MINIMUM OF 1/40 INCH (0.635 MM) ABOVE THE BACKGROUND. BRAILLE DOTS SHALL BE DOMED OR ROUNDED. CBC SECTION 11B-703.3 AND 11B-703.4.

6. SIGN TYPE EV1 FLOOR PLAN MUST SHOW:
   A. LOCATION OF ALL EXITS AND FIRE EXTINGUISHERS
   B. LOCATION OF ACCESSIBLE MEANS OF EGRESS
   C. LOCATION OF ALL FIRE ALARM PULL STATIONS
   D. DESCRIPTION OF FIRE ALARM SOUND AND VISUAL
   E. FIRE DEPARTMENT EMERGENCY NUMBER - 911
   F. "EMERGENCY EXIT PLAN" (1/2" MINIMUM CAP HEIGHT)

7. DOOR MOUNTED SIGNAGE TO BE DISTINCTLY DIFFERENT FROM DOOR IN COLOR AND CONTRAST, SEE SIGNAGE SCHEDULE FOR TYPE.

8. WALL MOUNTED SIGNAGE TO BE MOUNTED ON LATCH SIDE OF DOOR, CLEAR OF DOOR-SWING, SEE SIGNAGE SCHEDULE FOR TYPE.

9. INTERNATIONAL SYMBOL OF ACCESSIBILITY PROPORTIONS SHALL MATCH CBC FIGURE 11B-703.2.1

10. VERIFY ROOM NAME AND NUMBER WITH OWNER

11. SUBSURFACE IMAGE CENTERED ON SIGN

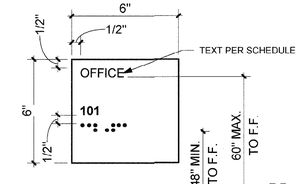
12. RAISED WHITE FIGURE ON BLUE BACKGROUND, BLUE COLOR SHALL BE EQUAL TO COLOR NO. 15090 IN FEDERAL STANDARD 595B.

13. INTERNATIONAL SYMBOL OF ACCESS FOR HEARING LOSS

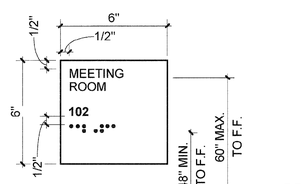
14. MOUNTING LOCATION: SIGNS WITH RAISED CHARACTERS AND BRAILLE SHALL BE LOCATED 48" MINIMUM TO THE BASELINE OF THE LOWEST LINE OF BRAILLE AND 60" MAXIMUM TO THE BASELINE OF THE HIGHEST LINE OF RAISED CHARACTERS ABOVE THE FINISH FLOOR OR GROUND SURFACE. MOUNTING LOCATION SHALL BE DETERMINED SO THAT A PERSON MAY APPROACH WITHIN 3 INCHES (76 MM) OF SIGNAGE WITHOUT ENCOUNTERING PROTRUDING OBJECTS OR STANDING WITHIN THE SWING OF A DOOR. CBC SECTION 11B-703.4.1
   A. A TACTILE SIGN SHALL BE LOCATED ON THE APPROACH SIDE, AS ONE ENTERS OR EXITS ROOMS OR SPACE, AND BE REACHED WITHIN 0" OF THE REQUIRED CLEAR FLOOR SPACE PER CBC SECTION AND FIGURE 11B-703.4.2 AS FOLLOWS:
      1. A CLEAR FLOOR SPACE OF 18"X18" MIN, CENTERED ON THE TACTILE CHARACTERS, SHALL BE PROVIDED BEYOND THE ARC OF ANY DOOR SWINGS BETWEEN THE CLOSED POSITION AND 45 DEGREE OPEN POSITION.
      2. ON THE WALL AT THE LATCH SIDE OF A SINGLE DOOR.
      3. ON THE INACTIVE LEAF OF A DOUBLE DOOR WITH ONE ACTIVE LEAF.
      4. ON THE WALL AT THE RIGHT SIDE OF A DOUBLE DOOR WITH TWO ACTIVE LEAFS.
      5. ON THE NEAREST ADJACENT WALL WHERE THERE IS NO WALL SPACE AT THE LATCH SIDE OFA SINGLE DOOR OR NO SPACE AT THE RIGHT SIDE OFA DOUBLE DOOR WITH TWO ACTIVE LEAFS.
   B. VISUAL CHARACTERS SHALL COMPLY WITH CBC SECTION 11B-703.5 AND SHALL BE 40" MIN. ABOVE FINISH FLOOR OR GROUND.
   C. PICTOGRAMS SHALL COMPLY WITH CBC SECTION 11B-703.6.

SIGNAGE SCHEDULE

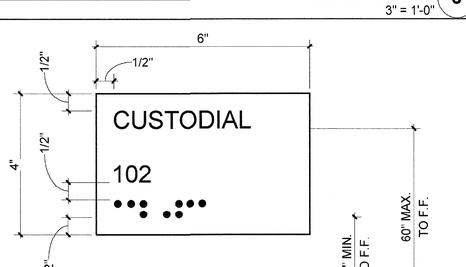
DOOR/ROOM NO.	ROOM (EXTERIOR)	ROOM (INTERIOR)	SIGN TYPE	ACCESS SYMBOL	COPY		EXIT	EXIT ROUTE	EVACUATION MAP (TYPE EV1)	RESTROOM SYMBOL	ASSIST. LISTENING (TYPE IN2a)	NOTE
100	X	EX2	RM4	X	OFFICE	(+ SYMBOL PER 8/A9.2)						MOUNT ON GLASS
101C	X		RM3a	X	MEETING ROOM	(+ SYMBOL PER 8/A9.2)						
102	X		RM2a	X	EQUIPMENT	(+ SYMBOL PER 8/A9.2)						
103B	X		RM2a	X	OFFICE AREA	(+ SYMBOL PER 8/A9.2)						
104	X		RM2a		SENIOR RANGER							
105	X		RM4		STORAGE							
106	X		RM2a	X	OFFICE AREA	(+ SYMBOL PER 8/A9.2)						
107	X		RM4		STORAGE							
108	X		RM2a	X	STAFF ONLY	(+ SYMBOL PER 8/A9.2)						
109	X		RM4	X	GARAGE	(+ SYMBOL PER 8/A9.2)						
110	X		RM2a		SHOWER							
111	X		RR5 / RR5a		ALL GENDER					X		
112	X		RM4		CUSTODIAL							
113	X		RM4		PLUMBING CHASE							
114	X		RM4		I.T. ROOM							
115	X		RR5 / RR5a		ALL GENDER					X		
116	X		RR5 / RR5a		ALL GENDER					X		
117C	X	EX2	RM4	X	WORKSHOP	(+ SYMBOL PER 8/A9.2)						
118	X		RM2a		OUTDOOR YARD							
119												
120	X		RM4		STORAGE							
121	X		RM4		ELECTRICAL ROOM							
101A	X		RM4		MEETING ROOM							
101B	X		RM4		MEETING ROOM							
102A	X		RM4		EQUIPMENT							
EXT.	X		BL1/BL2									



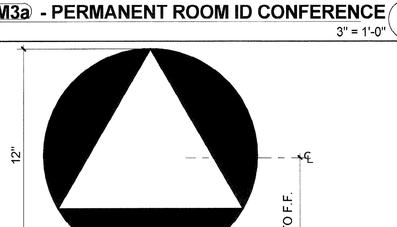
TYPE RM2a - PERMANENT ROOM ID OFFICE 5
3" = 1'-0"



TYPE RM3a - PERMANENT ROOM ID CONFERENCE 1
3" = 1'-0"

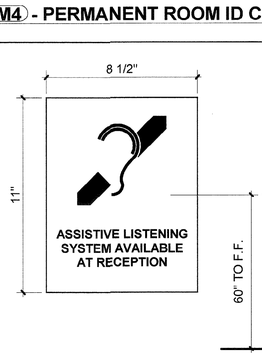


TYPE RM4 - PERMANENT ROOM ID CUSTODIAL 6
6" = 1'-0"

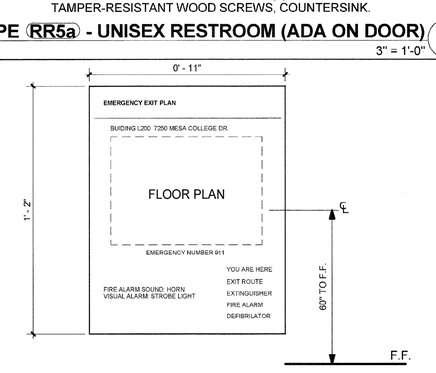


TYPE RR5a
SANITARY FACILITY ENTRY SIGN
UNISEX RESTROOM (1/4" THICK 12" DIA. CIRCLE / 1/4" THICK EQUILATERAL TRIANGLE ON DOOR). COLOR OF CIRLCE SHALL CONTRAST MINIMUM 70% (GREY VALUE) WITH COLOR OF TRIANGLE AND WITH COLOR OF DOOR. ATTACH SIGN USING ADHESIVE AND THREE (3) FLAT-HEAD CHROME TAMPER-RESISTANT WOOD SCREWS, COUNTERSINK.

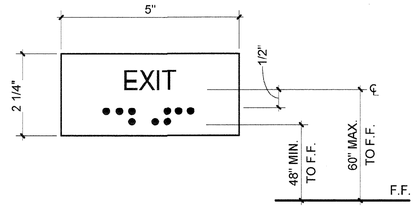
TYPE RR5a - UNISEX RESTROOM (ADA ON DOOR) 2
3" = 1'-0"



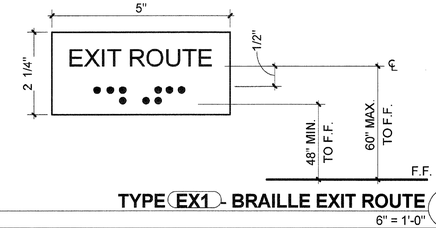
TYPE IN2a - ASSISTIVE LISTENING SYSTEM 7
3" = 1'-0"



TYPE EV1 - EVACUATION MAP SIGN 3
3" = 1'-0"

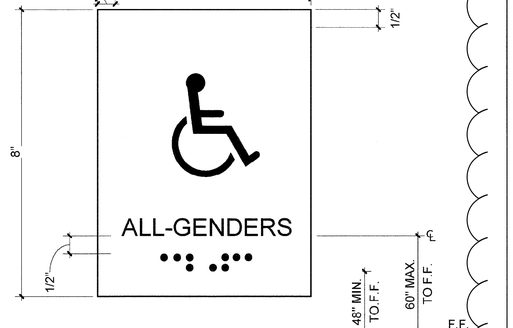


TYPE EX2 - BRAILLE EXIT 8
6" = 1'-0"

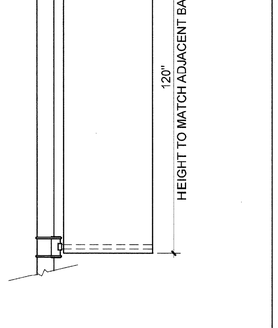


TYPE EX1 - BRAILLE EXIT ROUTE 4
6" = 1'-0"

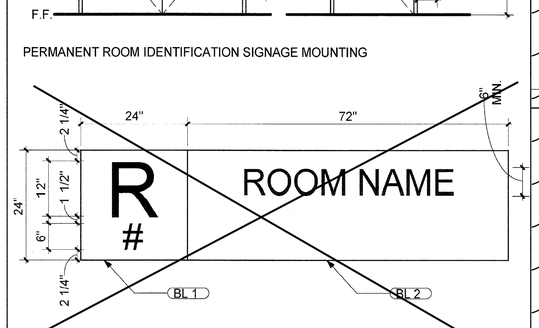
A9.3



TYPE RR5 - UNISEX RESTROOM (ADA ON WALL) 11
6" = 1'-0"



TYPE BN1 - BANNER 10
1/2" = 1'-0"



TYPE BL1 & BL2 - BUILDING ID 9
3/4" = 1'-0"

G

AS-BUILT INFORMATION

MATERIALS	MANUFACTURER

CONSULTANT

SPEC. NO.

PLANS FOR THE CONSTRUCTION OF MISSION TRAILS FIELD STATION EAST FORTUNA

SIGNAGE SCHEDULE & DETAILS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 51 OF 123 SHEETS

WBS S-14016

APPROVED
FOR CITY ENGINEER — 9/12/2017 DATE
JASON GRANI
PRINT DCE NAME — RCE#

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL			08/31/2017	
G ADDENDUM G			03/23/2018	

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

JORGE ACEVEDO	
PROJECT MANAGER	
MARLON PEREZ	
PROJECT ENGINEER	
246-1761	
CCS27 COORDINATE	
1889-6321	
CCS83 COORDINATE	

39038 - 51 - D

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN THE DRAWING IS NOT TO SCALE

The City of SAN DIEGO Public Works

DAVY ARCHITECTURE
SERVICE DISABLED VETERAN OWNED
1053 TENTH AVENUE
SAN DIEGO, CA 92102
PHONE 619.238.3811
FAX 619.238.0442
WWW.DAVYARCHITECTURE.COM

ARCHITECT ERIC H. DAVY RCE 41452 REGISTERED EXPIRES AUGUST 31, 2019 STATE OF CALIFORNIA

G SIGNAGE SCHEDULE/ BUILDING ID

ADDENDUM G

MISSION TRAILS FIELD STATION EAST FORTUNA

Bid Results

Bidder Details

Vendor Name	Act 1 Construction, Inc.
Address	444 Sixth Street bids@act1const.com Norco, CA 92860 United States
Respondee	Don Trenholm
Respondee Title	President
Phone	951-735-1184 Ext.
Email	bids@act1const.com
Vendor Type	PQUAL
License #	657517
CADIR	

Bid Detail

Bid Format	Electronic
Submitted	April 13, 2018 1:56:34 PM (Pacific)
Delivery Method	
Bid Responsive	
Bid Status	Submitted
Confirmation #	138594
Ranking	0

Respondee Comment

Buyer Comment

Attachments

File Title	File Name	File Type
Contractor's Certification	Contractor's Certification Mission Trails.pdf	Contractor's Certification of Pending Actions
BID BOND Act 1 Mission Trails	Bid Bond Mission Trails.pdf	Bid Bond

Line Items

Type	Item Code	UOM	Qty	Unit Price	Line Total	Comment
	Main Bid					
1	Bonds (Payment and Performance)					
	524126	LS	1	$65,000.00	$65,000.00	
2	Construction of Mission Trails Field Station and All Associated Site Work and Improvements at 14450 Equestrian Circle, San Diego, California, 92071.					
	236220	LS	1	$4,512,000.00	$4,512,000.00	
3	Building Permits (EOC Type I)					
	236220	AL	1	$50,000.00	$50,000.00	
4	WPCP Development					
	541330	LS	1	$15,000.00	$15,000.00	
5	WPCP Implementation					
	236220	LS	1	$20,000.00	$20,000.00	

Bid Results

Type	Item Code	UOM	Qty	Unit Price	Line Total	Comment
6	Field Orders (EOC Type II)					
		AL	1	$180,000.00	$180,000.00	
7	Clearing and Grubbing					
	238910	LS	1	$36,000.00	$36,000.00	
8	Furniture, Fixtures and Equipment (EOC Type I)					
	236220	AL	1	$100,000.00	$100,000.00	
9	Biological Monitoring and Reporting					
	541330	LS	1	$20,000.00	$20,000.00	
				Subtotal	**$4,998,000.00**	
				Total	**$4,998,000.00**	

Subcontractors

Name & Address	Description	License Num	CADIR	Amount	Type
Polestar Land Surveying Inc. 2495 pinto lane norco, CA 92860 United States	PLS8039, Survey	N/A	1000035283	$12,000.00	
Serenity Fire Protection 417 associated Rd#215 Brea, CA 92821 United States	Fire sprinkler system	902927	1000055751	$57,900.00	
Richardson Steel, Inc. 9102 Harness Street Spring Valley, CA 91977 United States	Structural steel and gates	756989	1000000243	$445,000.00	CAU,MALE,CADIR
Ace Electric, Inc. PO Box 601071 San Diego, CA 92160 United States	Electrical and low voltage	835109	100001519	$371,400.00	PQUAL
Richard E. Leaverton 32100 auld road winchester, CA 92596 United States	drywall, doors/hardware and glazing/storefront system	892058	1000015711	$212,500.00	
Boyce Roofing 4083 Oceanside Blvd Oceanside, CA 92056 United States	Roofing	653319	1000053193	$111,655.00	
Coast Landscaping Inc. 2230 La Mirada Dr Ste B Vista, CA 92081 United States	Landscape and irrigation, SLBE	353359	1000004310	$279,000.00	CAU,MALE,SLBE,PQUAL
DLG Contractors Inc. PO Box 2361 Alpine, CA 91901 United States	Acoustic wall panels, toilet accessories, and metal lockers. ELBE #17DL1425	988588	1000003891	$31,400.00	LAT,MALE,ELBE,SDB
Construction Testing & Engineering, Inc. 1441 Montiel Road Ste. 115 Escondido, CA 92026 United States	Testing and Inspection Services	N/A	1000006116	$44,355.00	CADIR
JL StormWater Consultants, Inc. 9745 Prospect Avenue, Suite 203 Santee, CA 92071 United States	SLBE cert # 4JL1316	N/A	1000036291	$15,000.00	CADIR,SDB,WBE

Bid Results

Name & Address	Description	License Num	CADIR	Amount	Type
Nicholas Mechanical HVAC Inc. 1260 N Hancock St ste 102 F Anaheim, CA 92807 United States	HVAC and mechanical	992453	1000055520	$120,000.00	
Manhole Builders 5021 Stone ave riverside, CA 92509 United States	tank inner spray lining	831892	1000012259	$17,955.00	
McCloskey Plumbing 15240 windjammer way lake elsinore, CA 92530 United States	Plumbing	996902	1000014764	$70,000.00	
Hufcor, Inc. 2380 E. Artesia Blvd. Long Beach, CA 90805 United States	Folding panel partitions	798710	1000008192	$18,650.00	
Kirk Paving, Inc. 8722 Winter Gardens Blvd. Lakeside, CA 92040 United States	Asphalt paving, SLBE #11KP0127	749206	1000002341	$29,550.00	CADIR,PQUAL,SDB, SLBE
Arce Custom Cabinets, Inc. 8845 Winter Gardens Blvd Lakeside, CA 92040 United States	Casework, SLBE #14AC1208	930618	1000005414	$51,783.00	CADIR,ELBE,FEM,LAT,MBE,SDB
Drake Integrations LLC 2515 Camino Del Rio South, Suite 338 San Diego, CA 92108 United States	HVAC commissioning services, SLBE	N/A	1000037781	$15,500.00	CAU,MALE,SLBE,CADIR