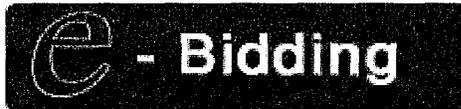


City of San Diego

CONTRACTOR'S NAME: EC CONSTRUCTORS, INC.
ADDRESS: 9834 River Street, Lakeside, CA 92040
TELEPHONE NO.: 619-440-7181 FAX NO.: 619-440-7180
CITY CONTACT: LISA NGUYEN, Contract Specialist, Email: LNguyen@sandiego.gov
Phone No. (619) 533-3435, Fax (619) 533-3450
M.Maria/A.James/egz

CONTRACT DOCUMENTS

ORIGINAL



FOR

POINT LOMA FIRE STATION NO. 22

BID NO.: K-16-5414-DBB-3
SAP NO. (WBS/IO/CC): S-00787
CLIENT DEPARTMENT: 1912
COUNCIL DISTRICT: 2
PROJECT TYPE: BC

THIS CONTRACT IS SUBJECT TO THE FOLLOWING:

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

BID DUE DATE:

**2:00 PM
DECEMBER 1, 2015
CITY OF SAN DIEGO
PUBLIC WORKS CONTRACTS
1010 SECOND AVENUE, 14th FLOOR, MS 614C
SAN DIEGO, CA 92101**

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CITY OF SAN DIEGO, CALIFORNIA

NOTICE INVITING BIDS

1. **FULL AND OPEN COMPETITION:** This contract may only be bid by Contractors on the City's approved Prequalified Contractor's List (see Notice Inviting Bids, Prequalification of Contractors), regardless of the status for SLBE-ELBE qualification(s). For information regarding the Contractors Prequalified list visit the City's web site: <http://www.sandiego.gov>.
2. **SUMMARY OF WORK:** The Work involves furnishing all labor, materials, equipment, services, and other incidental works and appurtenances for the construction of the Project as described in ATTACHMENT A.
3. **PRE-BID MEETING:**
 - 3.1. There will be a Pre-Bid Meeting to discuss the scope of the Project, bidding requirements, pre-qualification process, and Equal Opportunity Contracting Program requirements and reporting procedures in the Public Works Contracts Conference Room, at 1010 Second Avenue 14th Floor, San Diego, CA 92101, at **10:00 AM, on NOVEMBER 12, 2015.**
 - 3.2. All potential bidders are encouraged to attend.
4. **PRE-BID SITE VISIT:** The prospective Bidders are encouraged to visit the Work Site with the Engineer. The purpose of the Site visit is to acquaint Bidders with the Site conditions. To request a sign language or oral interpreter for this visit, call the Public Works Contracts at (619) 533-3450 at least 5 Working Days prior to the meeting to ensure availability. A Pre-Bid Site Visit is offered when the details are provided as follows:

Time:	1:30 PM
Date:	NOVEMBER 12, 2015
Location:	1055 Catalina Blvd., San Diego, CA 92107
5. **PREQUALIFICATION OF CONTRACTORS:**
 - 5.1. Contractors submitting Bid must be pre-qualified for the total amount proposed, inclusive of all alternate items prior to the date of submittal. Bids from contractors who have not been pre-qualified as applicable and Bids that exceed the maximum dollar amount at which contractors are pre-qualified 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>
 - 5.2. 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.
 - 5.3. As a result of the City's fiduciary requirement to safeguard vendor data, City staff will not be able to provide information regarding contractors' prequalification status over the telephone. Contractors may access real-time information about their prequalification status via their vendor profile on [PlanetBids™](#).

INSTRUCTIONS TO BIDDERS

1. **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 for the performance of work on **POINT LOMA FIRE STATION NO. 22** (Project).
 - 1.1. **BIDDERS MUST BE PRE-REGISTERED** with the City's bidding system and possess a system-assigned Digital ID in order to submit an electronic bid.
 - 1.2. 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.
 - 1.3. 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.
 - 1.4. **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.
 - 1.5. **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.
 - 1.6. Unit prices shall be entered for all unit price items. Unit prices shall not exceed two (2) decimal places. If the Unit prices entered exceed two (2) decimal places, the City will only use the first two digits after the decimal points without rounding up or down.
 - 1.7. **RECAPITULATION OF THE WORK.** Bids shall not contain any recapitulation of the Work. Conditional Bids will be rejected as being **non-responsive**. Alternative proposals will not be considered unless called for.

1.8. BIDS MAY BE WITHDRAWN by the Bidder prior to, but not after, the time fixed for opening of bids.

1.8.1. 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.

1.9. 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 in the cover of this solicitation at least five (5) working days prior to the Bid/Proposal due date to ensure availability.

2. ELECTRONIC BID SUBMISSIONS CARRY FULL FORCE AND EFFECT:

2.1. 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.

2.2. 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.

2.3. 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.

2.4. 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 may be extended by the number of days required for the City to obtain all items necessary to fulfill all conditions precedent.

3. BIDS ARE PUBLIC RECORDS: Upon receipt by the City, Bids shall become public records subject to public disclosure. It is the responsibility of the respondent to clearly identify any confidential, proprietary, trade secret or otherwise legally privileged information contained within the Bid. General references to sections of the California Public Records Act (PRA) will not suffice. If the Contractor does not provide applicable case law that clearly establishes that the requested information is exempt from the disclosure requirements of the PRA, the City shall be free to release the information when required in accordance with the PRA, pursuant to any other applicable law, or by order of any court or government agency, and the Contractor will hold the City harmless for release of this information.

4. SUBCONTRACTING PARTICIPATION PERCENTAGES:

4.1. The City has incorporated **mandatory** SLBE-ELBE subcontractor participation percentages to enhance competition and maximize subcontracting opportunities. For the purpose of achieving the mandatory subcontractor participation percentages, a recommended breakdown of the SLBE and ELBE subcontractor participation percentages based upon certified SLBE and ELBE firms has also been provided to achieve the mandatory subcontractor participation percentages:

1.	SLBE participation	3.6%
2.	ELBE participation	10.1%
3.	Total mandatory participation	13.7%

4.2. The Bidders are strongly encouraged to attend the Pre-Bid Meeting to better understand the Good Faith Effort requirements of this contract. See the City's document titled "SLBE Program, Instructions For Bidders Completing The Good Faith Effort Submittal" available at: <http://www.sandiego.gov/eoc/>

4.3. The Bid may be declared **non-responsive** if the Bidder fails the following mandatory conditions:

4.3.1. Bidder's inclusion of SLBE-ELBE certified subcontractors at the overall mandatory participation percentage identified in this document; OR.

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

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

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

5. CONTRACTOR REGISTRATION AND ELECTRONIC REPORTING SYSTEM:

5.1. **Prior** to the Award of the Contract or each Task Order, you and your Subcontractors and Suppliers must register with the City's web-based vendor registration and bid management system. 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 2-1.1.2, "Joint Venture Contractors" in The WHITEBOOK for details.
7. **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.
- 7.1. **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.
- 7.1.1. 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.
- 7.1.2. 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.

- 7.2. **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.
- 7.3. **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.
- 7.3.1. For contracts entered into on or after April 1, 2015, Contractor and their subcontractors shall furnish records specified in Labor Code section 1776 directly to the Labor Commissioner in the manner required by Labor Code section 1771.4.
- 7.4. **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.
- 7.5. **Working Hours.** Contractor and their subcontractors shall comply with California Labor Code sections 1810 through 1815, including but not limited to: (i) restrict working hours on public works contracts to eight hours a day and forty hours a week, unless all hours worked in excess of 8 hours per day are compensated at not less than 1½ times the basic rate of pay; and (ii) specify penalties to be imposed on design professionals and subcontractors of \$25 per worker per day for each day the worker works more than 8 hours per day and 40 hours per week in violation of California Labor Code sections 1810 through 1815.
- 7.6. **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.
- 7.7. **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."
- 7.8. **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.

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

7.9.1. 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.

8. INSURANCE REQUIREMENTS:

8.1. 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.

8.2. 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.

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

Title	Edition	Document Number
Standard Specifications for Public Works Construction ("The GREENBOOK")	2012	PITS070112-01
City of San Diego Standard Specifications for Public Works Construction ("The WHITEBOOK")*	2012	PITS070112-02
City of San Diego Standard Drawings*	2012	PITS070112-03
Caltrans Standard Specifications	2010	PITS070112-04
Caltrans Standard Plans	2010	PITS070112-05
California MUTCD	2012	PITS070112-06
City Standard Drawings - Updates Approved For Use (when specified)*	Varies	Varies

Title	Edition	Document Number
Standard Federal Equal Employment Opportunity Construction Contract Specifications and the Equal Opportunity Clause Dated 09-11-84	1984	769023
NOTE: *Available online under Engineering Documents and References at: http://www.sandiego.gov/publicworks/edocref/index.shtml		

- 10. CITY'S RESPONSES AND ADDENDA:** The City, at its option, 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 addendum are made effective as though originally issued with the Bid. The Bidders shall acknowledge the receipt of Addenda at the time of bid submission.
- 11. 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.
- 12. CONTRACT PRICING FORMAT:** This solicitation is for a Lump Sum contract with Unit Price provisions as set forth herein.
- 12.1.** Bids shall not contain any recapitulation of the Work. Conditional Bids will be rejected as being non-responsive. Alternative proposals will not be considered unless called for.
- 12.2.** The Bidder agrees to the construction of **Point Loma Fire Station No. 22**, for the City of San Diego, in accordance with these contract documents for the prices listed below. The Bidder guarantees the Contract Price for a period of 120 days (90 days for federally funded contracts and contracts valued at \$500,000 or less) from the date of Bid opening to Award of the Contract. The duration of the Contract Price guarantee shall be extended by the number of days required for the City to obtain all items necessary to fulfill all conditions precedent e.g., bond and insurance.
- 12.3.** Unit prices shall be entered for all unit-price items. Unit prices shall not exceed two (2) decimal places. If the Unit prices entered exceeds two (2) decimal places, the City will only use the first two digits after the decimal points without rounding up or down.
- 13. SUBCONTRACTOR INFORMATION:**
- 13.1. 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 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.

13.2. 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)** 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.

13.3. 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.

14. SUBMITTAL OF "OR EQUAL" ITEMS: See Section 4-1.6, "Trade Names or Equals" in The WHITEBOOK and as amended in the SSP.

15. AWARD PROCESS:

15.1. The Award of this contract is contingent upon the Contractor's compliance with all conditions precedent to Award.

15.2. 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.

15.3. This contract will be deemed executed, and effective, only upon the signing of the Contract by the Mayor or designee of the City and approval as to form the City Attorney's Office.

15.4. The low Bid will be determined by Base Bid alone.

15.5. Once the low bid has been determined, the City may, at its sole discretion, award the contract for the Base bid alone.

16. **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 may render the bid **non-responsive** and ineligible for award.
17. **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.
18. **SUBMISSION OF QUESTIONS:**
- 18.1. The Director (or designee), of the Public Works Department is the officer responsible for opening, examining, and evaluating the competitive Bids submitted to the City for the acquisition, construction and completion of any public improvement except when otherwise set forth in these documents. All questions related to this solicitation shall be submitted to:
- Public Works Contracts
1010 Second Avenue, 14th Floor
San Diego, California, 92101
Attention: [Contract Specialist listed on the front cover hereof]
- OR:
- Email address of the Contract Specialist listed on the front cover hereof.
- 18.2. Questions received less than 14 days prior to the date for opening of Bids may not be considered.
- 18.3. Clarifications deemed by the City to be material shall be issued by Addenda and uploaded to the City's online bidding service.
- 18.4. 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 become informed of any Addenda that have been issued and to include all such information in its Bid.
19. **ONLY ONE BID PER CONTRACTOR SHALL BE ACCEPTED:** No person, firm, or corporation shall be allowed to make, file, or be interested in more than one (1) Bid for the same work unless alternate Bids are called for. A person, firm or corporation who has submitted a sub-proposal to a Bidder, or who has quoted prices on materials to a Bidder, is not hereby disqualified from submitting a sub-proposal or quoting prices to other Bidders or from submitting a Bid in its own behalf. Any Bidder who submits more than one bid will result in the rejection of all bids submitted.
20. **SAN DIEGO BUSINESS TAX CERTIFICATE:** The Contractor and Subcontractors, not already having a City of San Diego Business Tax Certificate for the work contemplated shall secure the appropriate certificate from the City Treasurer, Civic Center Plaza, first floor and submit to the Contract Specialist upon request or as specified in the Contract Documents. Tax Identification numbers for both the Bidder and the listed Subcontractors must be submitted on the City provided forms within these documents.

21. BIDDER'S GUARANTEE OF GOOD FAITH (BID SECURITY):

- 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 the entire Bid schedule (also referred to as "schedule of prices" or Proposal form). Incomplete price schedules may be rejected as being non-responsive.
- 22.3. The City reserves the right to reject any or all Bids, and to waive any informality or technicality in Bids received and any requirements of these specifications as to bidding procedure.
- 22.4. Bidders will not be released on account of their errors of judgment. Bidders may be released only upon receipt by the City from the Bidder within 3 Working Days, excluding Saturdays, Sundays, and state holidays, after the opening of Bids, of written notice which includes proof of honest, credible, clerical error of material nature, free from fraud or fraudulent intent, and of evidence that reasonable care was observed in the preparation of the Bid.
- 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 section 22.3017 of the San Diego Municipal Code.

- 22.6. The City of San Diego will not discriminate with regard to race, religious creed, color, national origin, ancestry, physical handicap, marital status, sex or age, in the award of contracts.
- 22.7. Each Bid package properly executed as required by these specifications shall constitute a firm offer, which may be accepted by the City within the time specified in the Proposal.
- 22.8. The City reserves the right to evaluate all Bids and determine the lowest Bidder on the basis of any proposed alternates, additive items or options 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 Bid results, visit the City's eBidding site, request results via e-mail to the "City Contact" person listed in the title page of these documents, or via courier, personal delivery or U.S. Postal service delivery of a request for results accompanied by provide a self-addressed, stamped envelope, referencing bid number and bid tabulations will be mailed. Bid results cannot 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 Pledge of Compliance.
- 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.

28. PHASED FUNDING:

For additional Phased Funding Provisions, see Attachment B.

**CONTRACT AGREEMENT AND
PERFORMANCE BOND, LABOR AND MATERIALMEN'S BOND**



Approved by: _____
 Date: _____
 Alliant Use Only

bond request form

Principal / Contractor: EC Constructors, Inc.
 Obligor: City of San Diego
 Address: 1010 Second Avenue, San Diego, CA 92101
 Project Title: Point Loma Fire Station No. 22
 Project / Solicitation No.: K-16-5414-DBB-3
 Completion Time: 440 Working Days Liquidated Damages: \$1,000/Day
 Warranty / Maintenance Period: 2 Years Retention: 5%
 Uncompleted Work on Hand: \$19,877,192
 Comments / Special Instructions: As of 12/31/15 does not include JV work; Includes Job 256

bid bond (please complete in addition to the above)

Bid Date and Time:	<u>12/1/2015 @ 2:00pm</u>	Percent of Bid:	<u>10%</u>
Engineer's Estimate:	<u>\$4,771,000</u>	Contractor's Estimate:	<u>\$4,771,000</u>
Description / Scope of Work:	<u>Demolition of existing Fire Station and the construction of a 6,180 SF new station</u>		
Owner's Form (please attach):	<u>Attached</u>	Surety Form:	_____

performance / payment (please complete in addition to the above)

Contract Amount:	<u>\$5,741,750.00</u>	Bid Results: Low Bidder:	<u>\$5,741,750</u>
Performance:	<u>Yes</u>	2nd Bidder:	<u>\$5,958,858</u>
Payment:	<u>Yes</u>	3rd Bidder:	<u>\$5,998,000</u>
No. of Original Bonds Needed:	<u>Three (3)</u>		

IMPORTANT: Please include copies of Award Letter, Agreement and any required Bond Forms.

Requested by: Jim Summers Date: 1/18/16
 Need By Date: 1/21/16

**Please email request to: jclampert@alliant.com
 or fax request to: (619) 699-2110**

Alliant Insurance Services, Inc.
 an Alliant Resources Group company
 701 B Street, 6th Floor, San Diego, CA 92101-8156 619-238-1828
 Lic #OC36861

CONTRACT AGREEMENT

CONSTRUCTION CONTRACT

This contract is made and entered into between THE CITY OF SAN DIEGO, a municipal corporation, herein called "City", and EC CONSTRUCTORS, INC. herein called "Contractor" for construction of **Point Loma Fire Station No. 22**; Bid No. **K-16-5414-DBB-3**; in the amount of FIVE MILLION SEVEN HUNDRED FORTY ONE THOUSAND SEVEN HUNDRED FIFTY DOLLARS 00/100 (\$5,741,750.00), which is comprised of the Base Bid alone.

IN CONSIDERATION of the payments to be made hereunder and the mutual undertakings of the parties hereto, City and Contractor agree as follows:

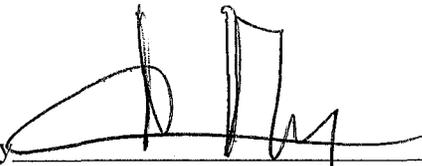
1. The following are incorporated into this contract as though fully set forth herein:
 - (a) The attached Faithful Performance and Payment Bonds.
 - (b) The attached Proposal included in the Bid documents by the Contractor.
 - (c) Reference Standards listed in the Notice Inviting Bids and the Supplementary Special Provisions (SSP).
 - (d) Phased Funding Schedule Agreement
 - (e) That certain documents entitled **Point Loma Fire Station No. 22**, on file in the office of the Public Works Department as Document No. **S-00787**, 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 **Point Loma Fire Station No. 22**, Bid Number **K-16-5414-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.

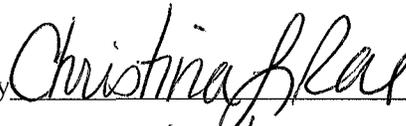
CONTRACT AGREEMENT (continued)

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

THE CITY OF SAN DIEGO

APPROVED AS TO FORM

By 
Print Name: Albert P. Rechany, Deputy Director

Jan I. Goldsmith, City Attorney
By 
Print Name: Christina L. Rae
Deputy City Attorney

Date: 3/25/2016

Date: 3/29/16

CONTRACTOR

EC Constructors, Inc.

By 
Print Name: Sherri L. Summers

Title: CEO

Date: January 20, 2016

City of San Diego License No.: B2012044182

State Contractor's License No.: 585677

DEPARTMENT OF INDUSTRIAL RELATIONS (DIR) REGISTRATION NUMBER: 1000004249

PERFORMANCE BOND, LABOR AND MATERIALMEN'S BOND

FAITHFUL PERFORMANCE BOND AND LABOR AND MATERIALMEN'S BOND:

EC CONSTRUCTORS, INC., a corporation, as principal, and Hartford Fire Insurance Company, a corporation authorized to do business in the State of California, as Surety, hereby obligate themselves, their successors and assigns, jointly and severally, to The City of San Diego a municipal corporation in the sum of FIVE MILLION SEVEN HUNDRED FORTY ONE THOUSAND SEVEN HUNDRED FIFTY DOLLARS 00/100 (\$5,741,750.00) for the faithful performance of the annexed contract, and in the sum of FIVE MILLION SEVEN HUNDRED FORTY ONE THOUSAND SEVEN HUNDRED FIFTY DOLLARS 00/100 (\$5,741,750.00) for the benefit of laborers and materialmen designated below.

Conditions:

If the Principal shall faithfully perform the annexed contract **Point Loma Fire Station No. 22, Bid Number K-16-5414-DBB-3**, San Diego, California then the obligation herein with respect to a faithful performance shall be void; otherwise it shall remain in full force.

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

The obligation herein with respect to laborers and materialmen shall inure to the benefit of all persons, firms and corporations entitled to file claims under the provisions of 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 January 20, 2016

Approved as to Form

EC Constructors, Inc.
Principal

By Sherril Summers

Sherril L. Summers, CEO
Printed Name of Person Signing for Principal

Jan I. Goldsmith, City Attorney

By Christina Rae
Deputy City Attorney 3/29/16

Hartford Fire Insurance Company
Surety

By Charlotte Aquino
Charlotte Aquino, Attorney-in-fact

Approved:

By [Signature]
Albert P. Rechany, Deputy Director

One Pointe Drive, 6th Floor
Local Address of Surety

Brea, CA 92821
Local Address (City, State) of Surety

(714) 674-1307
Local Telephone No. of Surety

Premium \$ 61,449.00 PREMIUM IS FOR CONTRACT TERM AND SUBJECT TO ADJUSTMENT BASED ON FINAL CONTRACT PRICE

Bond No. 72BCSHG8086

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT Civil Code § 1189

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

STATE OF CALIFORNIA

County of San Diego }

On JAN 20 2016 before me, Sarah Myers, Notary Public,
Date Insert Name of Notary exactly as it appears on the official seal

personally appeared Charlotte Aquino
Name(s) of Signer(s)

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

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

Witness my hand and official seal.

Signature [Signature]
Signature of Notary Public Sarah Myers



Place Notary Seal Above

OPTIONAL

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

Description of Attached Document

Title or Type of Document: _____

Document Date: _____ Number of Pages: _____

Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____

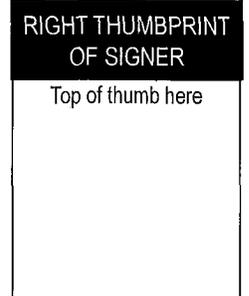
- Individual
- Corporate Officer — Title(s): _____
- Partner Limited General
- Attorney in Fact
- Trustee
- Guardian or Conservator
- Other: _____



Signer is Representing:
Surety Company

Signer's Name: _____

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



Signer is Representing:

POWER OF ATTORNEY

Direct Inquiries/Claims to:

THE HARTFORD
BOND, T-4
One Hartford Plaza
Hartford, Connecticut 06155

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

Agency Code: 72-160200

KNOW ALL PERSONS BY THESE PRESENTS THAT:

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

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

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

of
San Diego, CA

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

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



Wesley W. Cowling

Wesley W. Cowling, Assistant Secretary

M. Ross Fisher

M. Ross Fisher, Vice President

STATE OF CONNECTICUT }
COUNTY OF HARTFORD } ss. Hartford

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



CERTIFICATE

Kathleen T. Maynard
Kathleen T. Maynard
Notary Public
My Commission Expires July 31, 2016

I, the undersigned, Vice President of the Companies, DO HEREBY CERTIFY that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which is still in full force effective as of January 20, 2016
Signed and sealed at the City of Hartford.



Gary W. Stumper

Gary W. Stumper, Vice President

ATTACHMENTS

ATTACHMENT A
SCOPE OF WORK

SCOPE OF WORK

1. **SCOPE OF WORK:** The Scope of Work includes demolition of the existing Fire station located at 1055 Catalina Blvd, San Diego, CA, 92107 and the construction of a (6,180 SF) new Permanent station at the same site location. The scope also, includes assembling temporary station components (located next to the existing station on the same site/property), which consist of a (sprung structure and state approved trailer/coach with related site improvements) to accommodate the fire crew until the construction of the new Permanent station is completed. Once the new Permanent station is completed the fire fighters can move into the new facility. The sprung structure and the trailer/coach to be moved to storage within 30 miles radius from the no longer needed temporary station site location.

1.1. The Work shall be performed in accordance with:

1.1.1. The Notice Inviting Bids and Plans numbered **31704-1-D** through **31704-113-D** (Permanent Point Loma Fire Station No. 22) and **39051-1-D** through **39051-41-D** (Temporary Fire Station No. 22), inclusive.

2. **CONSTRUCTION COST:** The City's estimated construction cost for this contract is **\$4,771,000.00**.

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

In the Point Loma Community, 1055 Catalina Blvd., San Diego, CA 92107

4. **CONTRACT TIME:** The Contract Time for completion of the Work shall be **440 Working Days**.

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

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

- CLASS B

ATTACHMENT B
PHASED FUNDING PROVISIONS

PHASED FUNDING PROVISIONS

1. PHASED FUNDING:

- 1.1. For phased funded contracts, the City typically secures enough funds for the first 90 days of the contract prior to award. Within 10 Working Days after Bid opening date the Apparent Low Bidder must contact the Project Manager to discuss fund availability and the duration of the first phase and submit the Pre-Award Schedule to the City for approval and preparation of the first Phased Funding Schedule Agreement.
- 1.2. The Apparent Low Bidder will be required to provide a Pre-award Schedule in accordance with 6-1, "CONSTRUCTION SCHEDULE AND COMMENCEMENT OF THE WORK" and 9-3, "PAYMENT" prior to award of Contract.
- 1.3. If the Bid submitted by the Apparent Low Bidder is rejected by the City for any reason, then within 5 Working Days after receiving notice, the next Apparent Low Bidder must provide the Pre-Award Schedule. This process will continue until the City has selected the Apparent Low Bidder or have decided to reject all Bids.
- 1.4. The first Phased Funding Schedule Agreement must show the fund availability for the first phase. Within 22 Working Days from the date of the Bid Opening or notice to the next Apparent Low Bidder (whichever occurs last) and once a Pre-Award Schedule is accepted by the City, the City will present the first Phased Funding Schedule Agreement to you when you are selected as the Apparent Low Bidder as defined in the City's Municipal Code, §22.3003.
- 1.5. At the City's request, you must meet with the City's project manager before execution of the first Phased Funding Schedule Agreement to discuss his or her comments and requests for revision to the Pre-Award Schedule.
- 1.6. Your failure to perform the following may result in the Bid being rejected as **non-responsive**:
 1. meet with the City's project manager, if requested to do so, to discuss and respond to the City's comments regarding the Pre-Award Schedule,
 2. revise the Pre-Award Schedule as requested by the City within the specified 22 Working Days timeframe, or
 3. execute the first Phased Funding Schedule Agreement within a day after receipt.

PHASED FUNDING SCHEDULE AGREEMENT

Check one:

- First Phased Funding Schedule Agreement
- Final Phased Funding Schedule Agreement

NOTE: THIS IS A SAMPLE PHASED FUNDING SCHEDULE AGREEMENT FORM. Particulars left blank in this sample, the total number of phases, and the amounts assigned to each phase will be filled with funding specific information as the result of the Pre-Award Schedule, and subsequent Schedules, required by these Bid Documents and approved by the City.

BID NUMBER: K-16-5414-DBB-3

CONTRACT OR TASK TITLE: POINT LOMA FIRE STATION NO. 22

CONTRACTOR: EC CONSTRUCTORS INC.

Funding Phase	Phase Description	Phase Start	Phase Finish	Not-to-Exceed Amount
1	Construction of Temporary Fire Station.	April 2016	October 2016	\$860,246.00
2	Construction of Permanent Fire Station.	April 2016	February 2018	\$4,881,504.00
Total				\$5,741,750.00

Notes:

- (1) City Supplement 9-3.6, "PHASED FUNDING COMPENSATION" applies.
- (2) The total of all funding phases shall be equal to the TOTAL BID PRICE as shown on BID SCHEDULE 1 - PRICES.
- (3) This PHASED FUNDING SCHEDULE AGREEMENT will be incorporated into the CONTRACT and shall only be revised by a written modification to the CONTRACT.

CITY OF SAN DIEGO
 By: Michael Maria
 Name: Michael Maria
 Project Manager
 Department Name: Public Works
 Date: March 15, 2016

CONTRACTOR
 By: [Signature]
 Name: JAMES J. SUMMERS
 Title: PRESIDENT
 Date: 3/16/16

-END OF PHASED FUNDING SCHEDULE AGREEMENT-

ATTACHMENT C

EQUAL OPPORTUNITY CONTRACTING PROGRAM

EQUAL OPPORTUNITY CONTRACTING PROGRAM

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

D. CITY'S EQUAL OPPORTUNITY COMMITMENT.

1. Nondiscrimination in Contracting Ordinance.

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

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

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

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

E. EQUAL EMPLOYMENT OPPORTUNITY OUTREACH PROGRAM.

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

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

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

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

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

ATTACHMENT D
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ATTACHMENT E
SUPPLEMENTARY SPECIAL PROVISIONS

SUPPLEMENTARY SPECIAL PROVISIONS

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

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

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

1-2 TERMS AND DEFINITIONS.

Normal Working Hours. To the City Supplement, 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. DELETE in its entirety and SUBSTITUTE with the following:

1. You must perform, with your own organization, Contract work amounting to at least 30% of the base bid alone or base bid and any additive or deductive alternate(s) that together when added or deducted form the basis of award.

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

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

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

The Product Submittal Form is available for download at:

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

2-7

SUBSURFACE DATA. ADD the following:

4. In preparation of the Contract Documents, the designer has relied upon the following reports of explorations and tests of subsurface conditions at the Work Site:
 1. Geotechnical Evaluation Fire Station 22, dated February 29, 2008 by Ninyo & Moore and Associates
 2. Updated Geotechnical Evaluation Fire Station 22, dated March 11, 2011 by Ninyo & Moore and Associates
 3. Additional Geotechnical Evaluation to Access Depths of Fills, dated October 21, 2011 by Ninyo & Moore and Associates.
 4. Geotechnical Evaluation Temporary Fire Station Access Road fire Station 22, dated March 6, 2015 (ROAD) by Ninyo & Moore and Associates
 5. Supplemental Information for the Updated Geotechnical Evaluation Fire Station 22, dated March 6, 2015 (PAD) by Ninyo & More and Associates.

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

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

2-9.1

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

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

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

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

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

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

2-9.2 Survey Service. DELETE in its entirety and SUBSTITUTE with the following:

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

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

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

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

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

2-9.2.1 Survey Files. All Computer Aided Drafting (CAD) work must be done in accordance with The City of San Diego's Citywide Computer Aided Design and Drafting (CADD) Standards and must be in City seed files (.job, .txt, .dgn, .alg, .raw, .fwd, .dtm, .pdf, .docx, .xlsx, .tif, and .jpg).

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

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

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

- a. Street center line and (record width) right-of-way lines
- b. Project geometry (.alg) files (this will be generated for use in InRoads)
- c. 3D surface model (.dtm, break line and spot elevation) file

- d. Spot elevations of the new utility main at each intersection, midblock and for any change in grade
- e. Monuments
- f. Curb lines (top curb and gutter)
- g. All other appurtenances including but not limited to water valves, meters, vaults, manholes, fire hydrants, utility boxes, cleanouts and poles

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

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

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

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

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

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

2-11.1.1 General. To the City Supplement, item 2, ADD the following:

Time lapse video robotic cameras must provide a clear view of backfill and compaction operations. When this is not possible if camera is mounted on excavator, camera must be mounted on a portable tower or similar device and repositioned as Work progresses.

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

In preparation of the Contract Documents, the designer has relied upon the following studies, data, reports of explorations, and tests:

1. Hazardous Building Materials Survey Point Loma Fire Station No. 22, dated June 25, 2015.
2. Water Quality Technical Report, dated February 21, 2014.
3. GEOCON Site Assessment Report, dated July 2000.

4. Storm Drain Report for Fire Station No. 22, dated May 17, 2011.

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

<ftp://ftp.sannet.gov/OUT/ECP/2-15%20TECHNICAL%20STUDIES%20AND%20DATA/>

SECTION 4 – CONTROL OF MATERIALS

- 4-1.3.4 Inspection Paid For By the Contractor.** To the City Supplement, ADD the following:

See Special Inspections noted on Sheets T-2 and S0.1A.

- 4-1.3.6 Preapproved Materials.** To the City Supplement, ADD the following:

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

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

You must submit your list of proposed substitutions for “an equal” (“or equal”) item(s) **no later than 15 Working Days after the determination of the Apparent Low Bidder** and on the City’s Product Submittal Form available at:

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

SECTION 7 – RESPONSIBILITIES OF THE CONTRACTOR

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

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

- 7-3.1 Policies and Procedures.**

1. You must procure the insurance described below, at its sole cost and expense, to provide coverage against claims for loss including injuries to persons or damage to property, which may arise out of or in connection with the performance of the Work by you, your agents, representatives, officers, employees or Subcontractors.
2. Insurance coverage for property damage resulting from your operations is on a replacement cost valuation. The market value will not be accepted.
3. You must maintain this insurance for the duration of this contract and at all times thereafter when you are correcting, removing, or replacing Work in accordance with this contract. Your liabilities under the Contract, e.g., your indemnity obligations, is not deemed limited to the insurance coverage required by this contract.

4. Payment for insurance is included in the various items of Work as bid by you, and except as specifically agreed to by the City in writing, you are not entitled to any additional payment. Do not begin any work under this contract until you have provided and the City has approved all required insurance.
5. Policies of insurance must provide that the City is entitled to 30 days (10 days for cancellation due to non-payment of premium) prior written notice of cancellation or non-renewal of the policy. Maintenance of specified insurance coverage is a material element of the Contract. Your failure to maintain or renew coverage or to provide evidence of renewal during the term of the Contract may be treated by the City as a material breach of the Contract.

7-3.2 Types of Insurance.

7-3.2.1 Commercial General Liability Insurance.

1. Commercial General Liability Insurance must be written on the current version of the ISO Occurrence form CG 00 01 07 98 or an equivalent form providing coverage at least as broad.
2. The policy must cover liability arising from premises and operations, XCU (explosions, underground, and collapse), independent contractors, products/completed operations, personal injury and advertising injury, bodily injury, property damage, and liability assumed under an insured's contract (including the tort liability of another assumed in a business contract).
3. There must be no endorsement or modification limiting the scope of coverage for either "insured vs. insured" claims or contractual liability. You must maintain the same or equivalent insurance for at least 10 years following completion of the Work.
4. All costs of defense must be outside the policy limits. Policy coverage must be in liability limits of not less than the following:

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

7-3.2.2 Commercial Automobile Liability Insurance.

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

7-3.2.4

Contractors Hazardous Transporters Pollution Liability Insurance.

1. You must provide at your expense or require Subcontractor to provide, as described below Contractors Hazardous Transporters Pollution Liability Insurance including contractual liability coverage to cover liability arising out of transportation of hazardous or toxic, materials, substances, or any other pollutants by you or any Subcontractor in an amount not less than \$2,000,000 limit per occurrence/aggregate for bodily injury and property damage.
2. All costs of defense must be outside the limits of the policy. The deductible must not exceed \$25,000 per claim. Any such insurance provided by a subcontractor instead of you must be approved separately in writing by the City.
3. For approval of the substitution of Subcontractor's insurance the Contractor shall certify that all activities for which Contractors Hazardous Transporters Pollution Liability Insurance will provide coverage will be performed exclusively by the Subcontractor providing the insurance.
4. Contractual liability must include coverage of tort liability of another party to pay for bodily injury or property damage to a third person or organization. There must be no endorsement or modification of the coverage limiting the scope of coverage for either "insured vs. insured" claims or contractual liability. Occurrence based policies must be procured before the Work commences and must be maintained for the duration of this contract. Claims Made policies must be procured before the Work commences, must be maintained for the duration of this contract, and must include a 12 month extended Claims Discovery Period applicable to this contract or the existing policy or policies must continue to be maintained for 12 months after the completion of the Work under this contract without advancing the retroactive date.
5. Except as provided for under California law, the policy or policies must provide that the City is entitled to 30 days prior written notice (10 days for cancellation due to non-payment of premium) of cancellation or non-renewal of the policy or policies.

7-3.2.5

Contractors Builders Risk Property Insurance.

1. You must provide at its expense, and maintain until Final Acceptance of the Work, a Special Form Builders Risk Policy or Policies. This insurance must be in an amount equal to the replacement cost of the completed Work (without deduction for depreciation) including the cost of excavations, grading, and filling. The policy or policies limits must be 100% of this contract value of the Work plus 15% to cover administrative costs, design costs, and the costs of inspections and construction management.
2. Insured property must include material or portions of the Work located away from the Site but intended for use at the Site, and must cover material or portions of the Work in transit. The policy or policies must include as insured property scaffolding, falsework, and temporary buildings located at the Site. The policy or policies must cover the cost of removing debris, including demolition.

3. The policy or policies must provide that all proceeds thereunder must be payable to the City as Trustee for the insured, and must name the City, the Contractor, Subcontractors, and Suppliers of all tiers as named insured. We as Trustee will collect, adjust, and receive all monies which may become due and payable under the policy or policies, may compromise any and all claims thereunder, and will apply the proceeds of such insurance to the repair, reconstruction, or replacement of the Work.
4. Any deductible applicable to the insurance must be identified in the policy or policies documents and responsibility for paying the part of any loss not covered because of the application of such deductibles must be apportioned among the parties except for the City as follows: if there is more than one claimant for a single occurrence, then each claimant must pay a pro-rata share of the per occurrence deductible based upon the percentage of their paid claim to the total paid for insured. The City must be entitled to 100% of its loss. The Contractor must 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 must be responsible for 100% of the loss not insured because of the deductible. Except as provided for under California law, the policy or policies must provide that the 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 must be carried only by responsible insurance companies with a rating of, or equivalent to, at least "A-, VI" by A.M. Best Company, that are authorized by the California Insurance Commissioner to do business in the State, and that have been approved by the City.

7-3.3.1 Non-Admitted Carriers. The 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 must be subject to all of the requirements for policies of insurance provided by admitted carriers described herein.

7-3.4 Evidence of Insurance. Furnish to the 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 must be signed by the insurer or a person authorized by the insurer to bind coverage on its behalf. We reserve the right to require complete, certified copies of all insurance policies required herein.

7-3.5 Policy Endorsements.

7-3.5.1 Commercial General Liability Insurance.

7-3.5.1.1 Additional Insured.

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

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

7-3.5.1.3 Project General Aggregate Limit. The policy or policies must be endorsed to provide a Designated Construction Project General Aggregate Limit that will apply only to the Work. Only claims payments which arise from the Work must reduce the Designated Construction Project General Aggregate Limit. The Designated Construction Project General Aggregate Limit must be in addition to the aggregate limit provided for the products-completed operations hazard.

7-3.5.2 Commercial Automobile Liability Insurance.

7-3.5.2.1 Additional Insured. Unless the policy or policies of Commercial Auto Liability Insurance are written on an ISO form CA 00 01 12 90 or a later version of this form or equivalent form providing coverage at least as broad, the policy must be endorsed to include the City 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.

7-3.5.4 Contractors Hazardous Transporters Pollution Liability Insurance Endorsements.

7-3.5.4.1 Additional Insured.

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

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

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

7-3.5.5 Builders Risk Endorsements.

7-3.5.5.1 Waiver of Subrogation. The policy or policies must be endorsed to provide that the insurer will waive all rights of subrogation against the City, 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 desire 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 must immediately notify your Builder's Risk insurer and obtain an endorsement that the policy or policies must not be cancelled or lapse on account of any such partial use or occupancy. You must obtain the endorsement prior to our occupation and use.

7-3.6 Deductibles and Self-Insured Retentions. You must pay for all deductibles and self-insured retentions. You must disclose deductibles and self-insured retentions to the 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 must 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 must follow the form of the primary policy or policies e.g., all endorsements.

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

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

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

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

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

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

7-4.1.1 Waiver of Subrogation. The policy or policies must be endorsed to provide that the insurer will waive all rights of subrogation against the City, 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.

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

The City will obtain, at no cost to the Contractor; the following permits for the Permanent Point Loma Fire Station No. 22:

1. Building Permit,
2. Electrical Permit,
3. Mechanical & Plumbing Permits.

7-8.6 Water Pollution Control. ADD the following:

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

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

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

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

ADD:

7-16 COMMUNITY OUTREACH.

7-16.1 General.

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

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

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

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

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

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

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

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

7-16.1.1 Quality Assurance.

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

7-16.1.2 Submittals.

1. You shall submit to the Resident Engineer, for review and approval, all drafts of letters, notices, postcards, door hangers, signs, mailing lists, proposed addresses for hand-delivery, and any other notices and letters that are to be mailed and or distributed to the public.
 - a. Prior to distributing or mailing, you shall submit final drafts of letters, notices, postcards, door hangers, signs, and any other notices and letters to the Resident Engineer for final review and approval. Submit a PDF copy of the approved door hangers to the Engineer.
 - b. After distributing or mailing, you shall submit verification of delivery and any copies of returned notices to the Resident Engineer. Submit a PDF copy of the approved letters and notices to the Engineer.
2. You shall use the City's SDSshare site to identify and summarize communications (via phone, in person, and email) with the public within 24 hours of receipt, even if your response to the individual is still incomplete. You shall upload to the City's SDSshare site copies of all written, electronic, and verbal communications and conversations with the public.

7-16.1.3 Weekly Updates Recipients. Submit a weekly correspondence with updates, traffic control issues and locations, lane closures, and any other pertinent information (with additional contact names given during award process) to the following recipients:

Elif Cetin, Senior Engineer, ECetin@sandiego.gov

Michael Maria, Project Manager, MMaria@sandiego.gov

TBD, Resident Engineer, TBD@sandiego.gov

7-16.2 Community Outreach Services.

7-16.2.1 Public Notice by Contractor.

1. Post Project Identification Signs in accordance with section 7-10.6.2.
2. Notify businesses, institutions, property owners, residents or any other impacted stakeholders, within a minimum 300 feet radius of the Project, of construction activities and utility service interruptions not less than 5 days in advance.
3. Furnish and distribute public notices in the form of door hangers using the City's format to all occupants and/or property owners along streets:
 - a. Where Work is to be performed at least 5 days before starting construction or survey activities or impacting the community as approved by the Resident Engineer.

- b. Within 5 days of the completion of your construction activities where work was performed, you shall distribute public notices in the form of door hangers, which outlines the anticipated dates of Asphalt Resurfacing or Slurry Seal.
 - c. No less than 48 hours in advance and no more than 72 hours in advance of the scheduled resurfacing.
4. Leave the door hanger notices on or at the front door of each dwelling and apartment unit and at each tenant of commercial buildings abutting each of the street block segments. Where the front doors of apartment units are inaccessible, distribute the door hanger notices to the apartment manager or security officer.
 5. Door Hanger Material: You shall use Blanks/USA brand, Item Number DHJ5B6WH, 1 ¼" Holes (removed), 2-up Jumbo Door Hanger in Bristol White, or approved equal.
 6. Mailed Notice Material: You shall use Cougar by Domtar, Item Number 2834 or approved equal.
 7. For all Work on private property, contact each owner and occupant individually a minimum of 15 days prior to the Work. If the Work has been delayed, re-notify owners and occupants of the new Work schedule, as directed by the Resident Engineer.
 8. A sample of public notices is included in the Contract Appendix.

7-16.2.2 Communications with the Public.

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

7-16.2.3

Communications with Media.

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

7-16.4

Payment. The Payment for the Community Outreach Service is included in the various Bid items.

7-20

ELECTRONIC COMMUNICATION. ADD the following:

Virtual Project Manager will be used on this contract.

SECTION 9 – MEASUREMENT AND PAYMENT

9-3.2

Partial and Final Payment. DELETE paragraph three in its entirety and SUBSTITUTE with the following:

Upon commencement of the Work, an escrow account shall be established in a financial institution chosen by you and approved by the City. As progress payments are made to you, the retention portion is deposited by the City into the Escrow account. Documentation for an Escrow payment must have an Escrow agreement signed by you, the City and the Escrow Agent. Upon completion of the contract the City notifies the Escrow agent in writing to release the funds to you. Only the designated representative of the City shall sign the request for the release of Escrow funds.

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

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

ADD:

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

ADD:

212-3.2.2.3 Trench Marker Tape. To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

- a) Trench marker tape shall be 6" wide and consist of a minimum 5.0 mil, five-ply 100% virgin polyethylene which is acid, alkaline and corrosion resistant. Elongation properties and tensile strength of not less than 7,800 psi shall be in accordance with ASTM D882-80A. The trench marker tape for water lines shall have a minimum 20 gauge solid aluminum foil core, adhered to a 2.55 mil polyethylene backing.
- b) Tape color and legend shall be placed beneath the top protective layer subject to the following:
 - 1. Blue with "Caution Potable Water Line Buried Below" for Water mainlines and over pipe sleeves.
 - 2. Purple with "Caution Recycled/Reclaimed Water Line Buried Below" for recycled water irrigation mainlines.
 - 3. Red with "Caution Electric Line Buried Below" for electrical lines servicing the irrigation system, including, but not limited to, 110/220v power to irrigation controllers and pumps, communication cables and irrigation direct burial control wires to remote control valves.
 - 4. Green with "Caution Sewer Line Buried Below" for Sewer mainlines and over pipe sleeves.

SECTION 306 – UNDERGROUND CONDUIT CONSTRUCTION

306-1 OPEN TRENCH OPERATIONS. To the City Supplement, CORRECT certain section numbering as follows:

OLD SECTION NUMBER	TITLE	NEW SECTION NUMBER
306-1.8	House Connection Sewer (Laterals) and Cleanouts	306-1.9

OLD SECTION NUMBER	TITLE	NEW SECTION NUMBER
306-1.7.1	Payment	306-1.9.1
306-1.7.2	Sewer Lateral with Private Replumbing	306-1.9.2
306-1.7.2.1	location	306-1.9.21
306-1.7.2.2	Permits	306-1.9.2.2
306-1.7.2.3	Submittals	306-1.9.2.3
306-1.7.2.4	Trenchless Construction	306-1.9.2.4
306-1.7.2.5	Payment	306-1.9.2.5
306-1.7.3.6	Private Pump Installation	306-1.9.2.6
306-1.7.3.7	Payment	306-1.9.2.7

SECTION 701 – WATER POLLUTION CONTROL

701-13.9.4.1 BMP Requirements. To the City Supplement, ADD the following:

3. WTAP shall be required when the Project exceeds the Maximum Disturbed Area Requirements unless the grading Work is performed in phases that do not exceed the limit shown on the Plans per phase.

SECTION 705 – WATER DISCHARGES

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

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

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

SECTION 707 – RESOURCE DISCOVERIES

ADD:

707-1.1 Environmental Document. The City of San Diego Environmental Analysis Section (EAS) of the Development Services Department has prepared an **Environmental Exemption for Point Loma Fire Station No. 22**, as referenced in the Contract Appendix. You must comply with all requirements of the Environmental Exemption as set forth in the Contract **Appendix A**.

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

END OF SUPPLEMENTARY SPECIAL PROVISIONS (SSP)

TECHNICALS

TECHNICAL SPECIFICATIONS

**CITY OF SAN DIEGO
FIRE STATION #22
SAN DIEGO, CALIFORNIA**

CONTRACT DOCUMENTS
September 25, 2015

Nadel Studio One, Inc.
4445 Eastgate Mall, Suite 407
San Diego, CA 92121
T: 619.232.8424
F: 619.232.7179

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**TECHNICAL SPECIFICATIONS
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FIRE STATION #22**

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September 25, 2015

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SECTION 00 62 33

PRODUCTS FORM (LEED-NCv3.0)

Date: _____ Products Form Sheet Number: _____

PROJECT INFORMATION

Project: *City of San Diego* Nadel Project Number: **09310**
Fire Station #22 Contract For: _____
 To: _____

PRODUCT INFORMATION

Section No.: _____ Article/Paragraph: _____
 Specification Title: _____
 Product Name: _____
 Product Description: _____
 Trade Name: _____ Model No.: _____
 Manufacturer: _____ Phone: _____
 Manufacturer's Address: _____
 Installer: _____ Phone: _____
 Installer's Address: _____
 Product Cost (Total Material): \$ _____

SECTION I - SUSTAINABLE SITES (SS) CREDIT CONTRIBUTION

SS CREDIT 7.2 - HEAT ISLAND EFFECT, ROOF (ROOFING PRODUCTS - Division 07)

Product data attached to Product Form?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Solar Reflectance Index (ASTME1980)	
Low Slope $\leq 2:12$: ≥ 0.78	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Steep Slope $> 2:12$: ≥ 0.29	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

SECTION II - WATER EFFICIENCY (WE) CREDIT CONTRIBUTION

WE PREREQUISITE 1 & WE CREDIT 3 - WATER USE REDUCTION (Division 22 - Plumbing)

Toilet: <i>(attach ProductData)</i>	_____gpf
Urinals: <i>(attach ProductData)</i>	_____gpf
Showerhead: <i>(attach ProductData)</i>	_____gpm
Lavatory Faucets: <i>(attach ProductData)</i>	_____gpm
Kitchen/Break Room Faucets: <i>(attach ProductData)</i>	_____gpm
Metering Faucets: <i>(attach ProductData)</i>	_____gal / cy

SECTION III - ENERGY & ATMOSPHERE (EA) CREDIT CONTRIBUTION

EA PREREQUISITE 2 – MINIMUM ENERGY PERFORMANCE

Glass (attach Product Data)	
U value (insert value)	
SHGC (insert value)	
Wall Insulation (attach Product Data) R-value (insert value)	
Roof Insulation (attach Product Data) R-value (insert value)	

EA PREREQUISITE 3 – FUNDAMENTAL REFRIGERANT MANAGEMENT (Division 23 - Mechanical)

Refrigerant (base)	
Ozone Depleting Potential (ODP) (insert value)	
Global Warming Potential (GWP) (insert value)	

SECTION IV - MATERIALS AND RESOURCES (MR) CREDIT CONTRIBUTION

MR CREDIT 4 - RECYCLED CONTENT

Post Consumer	_____ %
Post Industrial	_____ %
Third Party Certified?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

MR CREDIT 5 – REGIONAL MATERIALS

Manufacturing Location:	City: _____ State: _____ Country: _____
Distance to Jobsite (Air Miles per Google Earth)	_____ Miles
Raw Material Harvest/Extraction Location (City, State, Country) (provide listing for each of the various components, if applicable)	City: _____ State: _____ Country: _____
Distance to Jobsite (Air Miles per Google Earth)	_____ Miles

MR CREDIT 6 – RAPIDLY RENEWABLE MATERIALS

Harvest Cycle	_____ Years
Percent of Product	_____ %

SECTION V - INDOOR ENVIRONMENTAL QUALITY (EQ) CREDIT CONTRIBUTION

EQ CREDIT 4.1 - ADHESIVES AND SEALANT (INTERIOR USES ONLY (see section 01 60 00)

Welding and Installation Adhesives (VOC Content)	_____ g/L
Substrate Adhesives (VOC Content)	_____ g/L
Sealants (VOC Content)	_____ g/L
Sealant Primers (VOC Content)	_____ g/L
Aerosol Adhesives (VOC Content)	_____ % by weight

EQ CREDIT 4.2 - PAINTS AND COATINGS (INTERIOR USES ONLY (see section 01 60 00)

Non-Flat (VOC Content)	_____ g/L
Flat (VOC Content)	_____ g/L
Meets Green Seal Standard	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

EQ CREDIT 4.3 - FLOORING SYSTEMS (see section 01 60 00)

Carpet meets testing/requirements of CRI Green Label Plus	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Carpet cushion meets requirements of CRI Green Label	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Carpet adhesive meets requirements of EQc4.1 (VOC < 50 g/L)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Hard surface flooring compliant with Floor Score	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Floor finishes (sealer/stain/finish) meet SCAQMD Rule 1113, (1/1/04)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Tile adhesives & grout meeting SCAQMD Rule 1168 (amended 1/7/05)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

EQ CREDIT 4.4 - COMPOSITE WOOD AND AGRIBOARD (see section 01 60 00)

Added Urea Formaldehyde	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
-------------------------	---

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

Attachments: _____

Instructions for Completion

Date: Insert date submitted.

Products Form Sheet Number: Do not fill in this blank. This is for the reviewer's use in identifying each data sheet as they are received.

PROJECT INFORMATION

Project Name: As shown on the cover of the Technical Specifications and on the title sheet of the Drawings.

A/E Project Number: This is the ARCHITECT'S project number, as indicated on the cover of the Technical Specifications and on the title sheet of the Drawings.

Contract For: This is typically "New Construction," but; can also be for "Alterations," or "Additions" as applicable to the project.

To: This is the reviewer of the document. Insert Architect's Name, UNLESS otherwise directed to insert Contractor's name or Owner's name.

PRODUCT INFORMATION

Section No., Article/Paragraph, Specification Title: As shown on the specification for this product within the Technical Specifications.

Product Name: As shown on the specification for this product within the Technical Specifications. Do not put "trade name" information here.

Product Description: A general description of the product that explains usage of the product.

Trade Name: Manufacturer's name for product.

Model No.: Specific number given for the product by the manufacturer.

Manufacturer, Phone, Address: Company name of the manufacturer of the product and a phone number to contact the manufacturer. Provide manufacturer's home office. (Manufacturing location is requested under MR Credit 5.0)

Installer, Phone, Address: Company name of the installer of the product and a phone number to contact the installer. Location of installer's home office

Product Cost (Total Material): This information is required to properly calculate percentages for the LEED Points.

Information for Sections I, II, III, IV and V: Provide information as applicable to product. Mark items as "N/A" if not applicable to product.

Submitted by, etc.: Provide complete information to allow reviewer to contact submitter if there are any questions.

Attachments: Attach product data to substantiate information on this Data Sheet.

DOCUMENT 00 63 13

REQUEST FOR INFORMATION /INTERPRETATION

Project: *City of San Diego* R.F.I Number: _____
Fire Station #22 From: _____
To: _____ Date: _____
_____ Nadel Project Number: **09310**

Specification Section: Paragraph: Drawing Reference: Detail

Request:

* Requested Date/Time for Response:

Signed by:

Response:

└ Attachments

Response From: To: * Date Rec'd: * Date Ret'd:

Signed by: _____

Copies: Δ Owner Δ Consultants Δ _____ Δ _____ Δ File

* Contractor shall allow up to 5 working days review and response time for RFI'S, unless review is required of multiple consultants, then the review and response period shall be 7 working days. Electronic RFI's (in PDF format only) may be submitted by E-Mail. (See Section 01 26 13).

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SECTION 00 63 25

**SUBSTITUTION REQUEST
(After the Bidding Phase)**

Project: *City of San Diego* Substitution Request Number: _____
Fire Station #22 From: _____ To: _____
Date: _____
Nadel Project Number: **09310**
Re: _____ Contract For: _____

Specification Title: _____ Description: _____
Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____
Manufacturer: _____ Address: _____ Phone: _____
Trade Name: _____ Model No.: _____
Installer: _____ Address: _____ Phone: _____ History: New product
 2-5 years old 5-10 years old More than 10 years old

Differences between proposed substitution and specified product: _____

Point-by point comparative data attached – REQUIRED BY A/E

Reason for not providing specified item: _____

Similar Installation:
Project: _____ Architect: _____
Address: _____ Owner: _____
Date Installed: _____

Proposed substitution affects other parts of Work: No Yes; explain _____

Savings to Owner for accepting substitution: _____ (\$ _____).

Proposed substitution changes Contract Time: No Yes [Add] [Deduct] _____ days.

Supporting Data Attached: Drawings Product Data Samples Tests Reports _____

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.
- ***Proposed substitution will not impact the LEED Certification of the project as specified in Section 01 81 13.***

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

Attachments: _____

A/E's REVIEW AND ACTION

- Substitution approved – Make submittals in accordance with Specification Section 01 33 00.
- Substitution approved as noted – Make submittals in accordance with Specification Section 01 33 00.
- Substitution rejected – Use specified materials.
- Substitution Request received too late – Use specified materials.

Signed by: _____ Date: _____

Additional Comments: Δ Contractor Δ Subcontractor Δ Supplier Δ Manufacturer Δ A/E Δ _____

SECTION 01 02 50

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 DESCRIPTION

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

1.2 BID PROPOSAL

- A. **Lump Sum Prices:** The CONTRACTOR shall provide Lump Sum Prices in the Bid Schedule for all WORK in the Contract Documents, except items of WORK listed in the Contract as Unit Priced Items. For Lump Sum items, only the total amount need be filled in.
- B. **Allowance Items:** Allowance Item amounts are provided by the OWNER to cover the cost of additive WORK not presently identified in the Contract Documents. Payment for Allowance Items will be made only when authorized as described in Part 1.3, below.
- C. **Retention:** Payment for all bid items is subject to the retention provisions of the General Conditions.
- D. **Schedule:** All scoped Allowance Bid Items and Unit Priced Bid Items are included in the scope of the Contract without specific locations for the WORK provided. The OWNER reserves the right to direct that these scoped items of WORK be performed when they are encountered, and the CONTRACTOR is obligated to accommodate this WORK within the original contract duration. The CONTRACTOR will not be entitled to additional time regardless of where the WORK is encountered.

- E. **Stipulated or Bid Unit Prices:** When the OWNER'S use of a Unit Price Bid Item exceeds 200% of the Bid Item quantity, the CONTRACTOR or OWNER may demand that the Unit Price Item be renegotiated for quantities in excess of the 200%, whether the price is stipulated or bid. This provision is to prevail over any conflicting general condition provision.
- F. Quantities for each item in the Bid Schedule will be used to analyze the bids and determine contract award.
- G. **Specified Items and Stipulated Prices:** The stipulated price for these items cannot be invoiced until the item is complete and accepted by the RESIDENTENGINEER.

1.3 MEASUREMENT AND PAYMENT

- A. **General:** This article defines the manner and method to develop the Lump Sum, Unit Price, and Allowance bid amounts of all items identified in the Bid Schedule. Bid amounts will include all plant, equipment, tools materials, labor, service, and all other items required to complete the WORK included in the Contract unless specifically excluded by this section. WORK required for which no separate bid item is identified will be considered as a subsidiary obligation of the CONTRACTOR, and the cost therefore shall be included in the most applicable bid item. Compensation for completion of the WORK will be determined by use of the cost loaded CPM schedule. Bid amounts for each item will be the basis for development of budget values for activities included in the cost loaded CPM schedule as described in the Contract Documents. Unit Price and Allowance Bid Item amounts will also be adjusted by a Change Order to the contract amount when WORK is completed, and actual authorized quantities and Allowance amounts are established.

B. **Contract-Required WORK
(PHASE 1)**

- 1. **Bid Item No. 1 - Construction of Temporary Fire Station No. 22 and related site improvements. (Lump Sum):**

Description: The lump sum payment for the Construction of Temporary Fire Station No. 22 located at 1055 Catalina Blvd. and related ("on" and "off") site improvements shall be considered full compensation for furnishing, demolition, constructing and completion of all facilities, mobilization, demobilization, insurance, supervision, planning, design, and engineering fees, complete as defined within these Contract Documents.

- 2. **Bid Item No. 2 – WPCP – Development – For Temporary Fire Station Best Management Practices as Required by the City of San Diego Land Development Manual Storm Standards of March 24, 2008 Report & Water. (Lump Sum).**
- 3. **Bid Item No. 3 - WPCP – Implementation – For Temporary Fire Station. (Lump Sum).**
- 4. **Bid Item No. 4 - Building Permits for Temporary Fire Station: (Allowance) including City of San Diego, Sheet C4 fees, Water & Sewer Capacities and Connection Fees (Reimbursement). Contractor to Include in Project Lump Sum Bid Cost for Mechanical, Plumbing**

Allowance Amount: = \$10,000.00

5. **Bid Item No. 5 - SDG&E Service Fee, Dry Utilities Connections, Pack Bell, AT&T and Time Warner – Temporary Fire Station – Type I. (Lump Sum).**
6. **Bid Item No. 6 – Bond (Payment and Performance) – Temporary Fire Station. (Lump Sum).**
7. **Bid Item No. 7 – FF & E – Temporary Fire Station. (Lump Sum).**
8. **Bid Item No. 8 – Field Orders – Temporary Fire Station – Type II. (Allowance).**
Allowance Amount: = \$30,000.00

(PHASE 2)

9. **Bid Item No. 9 - Construction of Permanent Fire Station No. 22 and related site improvements. (Lump Sum):**

Description: The lump sum payment for the Construction of Permanent Fire Station No. 22 located 1055 Catalina Blvd. and related ("on" and "off") site improvements shall be considered full compensation for furnishing, demolition, constructing and completion of all facilities, including but not limited to PhotoVoltaic roof system, mobilization, demobilization, insurance, supervision, planning, design, and engineering fees, complete as defined within these Contract Documents.
10. **Bid Item No. 10 –WPCP – Development – For Permanent Fire Station Best Management Practices as Required by the City of San Diego Land Development Manual Storm Standards of March 24, 2008 Report & Water. (Lump Sum).**
11. **Bid Item No. 11 - WPCP – Implementation – For Permanent Fire Station. (Lump Sum).**
12. **Bid Item No. 12 - Building Permits for Permanent Fire Station for any additional permits. (Allowance)**
Allowance Amount: = \$10,000.00
13. **Bid Item No. 13 – SDGE&E Service Fee, Dry Utilities Connections, Pack Bell, AT&T and Time Warner – Permanent Fire Station – Type I. (Lump Sum).**
14. **Bid Item No. 14 – Field Orders – Permanent Fire Station – Type II. (Allowance).**
Allowance Amount: = \$200,000.00
15. **Bid Item No. 15 – Bond (Payment and Performance) – Permanent Fire Station. (Lump Sum).**
16. **Bid Item No. 16 – FF & E – Permanent Fire Station. (Lump Sum).**

17. **Bid Item No. 17 – Remediation of Possible Contaminated Unusable Soil (to Include Preparation of Hazardous Waste Management Plan and Reporting per ‘Whitebook’ Section 803-16a as Determined by GEOCON Site Assessment Report dated July 2000. (Lump Sum).**

PART 2 - PRODUCTS

2.1 GENERAL PROGRESS PAYMENT REQUIREMENTS

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

2.2 APPLICATION FOR PAYMENT

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

- C. The Application for Payment is submitted according to the format and instructions provided by the City and covering the WORK completed through the last day of the previous month or through the date established by the City Representative/RESIDENT ENGINEER.

PART 3 - EXECUTION

3.1 MONTHLY REVIEWS/APPLICATION FOR PAYMENT

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

3.2 PAYMENT FOR PRODUCTS STORED ON SITE

- A. Refer to City Supplement section 9-3.3.1.1.
- B. The CONTRACTOR may request payment for products (material and/or equipment) which will be incorporated into the WORK and which are delivered and stored on-site. Payments for products stored at the site shall be based upon the cost of all acceptable materials and equipment not incorporated in the WORK but delivered and suitably stored at the site; provided each such individual item has a value of more than \$5,000.00 (five thousand) and will become a permanent part of the WORK. The Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that the CONTRACTOR has received the materials and equipment free and clear of all liens, charges, secured interests, and encumbrances and evidence that the materials and equipment are covered by appropriate property insurance as specified in the insurance provisions and other arrangements to protect the City's interest.

3.3 PARTIAL PAYMENTS FOR MATERIALS STORED OFF SITE

- A. Refer to City Supplement section 9-3.3.1.2.
- B. The CONTRACTOR may request partial payment for Products (material and/or equipment), which will be incorporated into the WORK and which are delivered and stored off-site. Any payments approved pursuant to this sub-section shall not exceed sixty-five percent (65%) of the Product's invoiced value and shall be subject to retainage as set forth in the General Conditions. The City reserves the right to refuse approval for payment for any Equipment or Materials suitably stored off-site in its sole discretion, regardless of whether all conditions contained herein have been met.
- C. Partial payment may be made for Products eligible for off-site delivery and storage only upon presentation by the CONTRACTOR of a Bill of Sale, an Invoice or an Affidavit certifying that the material is received by the CONTRACTOR free and clear of all liens, encumbrances and secured interests of any kind, and including, for off-site delivery, evidence acceptable to the City that "all-risks" property insurance in an amount sufficient to protect the interests of the City is in effect at the approved site, and that the City is a loss payee and an additional insured.

- D. Partial payment for Products delivered and stored off-site shall be contingent upon CONTRACTOR'S compliance with the storage and protective maintenance requirements set forth in the Contract Document provisions and all other requirements necessary to preserve equipment warranties for the benefit of the City.
- E. All costs associated with delivery to and storage at an off-site facility shall be assumed by the CONTRACTOR notwithstanding the CONTRACTOR'S request for and the obtaining from the City approval to so deliver and store the materials.
- F. CONTRACTOR shall provide written evidence to the City of having made arrangements for unrestricted access by the City and its authorized representatives to the materials wherever stored, including provision for the City to take control and possession of such materials at any time and without restriction.
- G. CONTRACTOR must provide the City, upon request and prior to any partial payment, documentation which transfers absolute legal title to such materials to the City conditional only upon receipt of final payment. Neither such transfer of title nor any partial payment shall constitute acceptance by the City of the materials, nor void the right to reject materials subsequently found to be unsatisfactory, or in any way relieve the CONTRACTOR of any obligation arising under the Contract Documents.

END OF SECTION

SECTION 01 11 00

SUMMARY OF WORK

1.1 WORK COVERED BY CONTRACT DOCUMENTS

- A. The summary of the scope of work includes demolition of the existing Fire station located at 1055 Catalina Blvd., San Diego, CA, 92107 and the construction of a (6,180 SF) new Permanent station at the same site location. The scope also includes assembling a temporary facility (located within same site and over future permanent staff parking lot), which consist of a (sprung structure and state approved trailer/coach with related site improvements) to accommodate the fire crew until the construction of the new Permanent station is completed. Once the new Permanent station is completed the fire fighters can move into the new facility. In addition to the scope of work, the temporary sprung structure and the trailer/coach to be moved to a storage within 30 miles radius from the no longer needed temporary station site location (The physical storage address will be provided by Fire department at a later time during the construction stage). Also, the majority of the related site improvements of the temporary site are to be demolished and removed, as noted in the plans. The entire scope of work is based on the entire contract documents such as but not limited to Contracts, addenda, drawings, specifications, reports, utility design documents, etc.
- B. Base Bid: The bid shall include labor, material, equipment, services and transportation necessary for the demolition and construction of the Project as identified in the Contract Documents.
- C. Sustainable/"Green" Requirements: The building(s) on the site and the sitework adjacent to the building(s) are designed and shall be constructed as sustainable entities. The requirements for sustainable/"green" construction are contained throughout the Contract Documents and in particular are specified in the following specification sections:
1. Section 01 35 43 - Environmental Procedures.
 2. Section 01 81 13 – Sustainable Design Requirements.
- D. The requirements of Tech Specs Part 1 – Special Provisions of City Volume 1 – General shall apply to all specification sections in Divisions 02 through 48 as if fully repeated therein and shall govern if there is a conflict.
- E. Extra Work: Performed at the same labor rates and component rates as the original work as specified and indicated on Drawings.
- F. Costs for Work which is not specified or indicated on Drawings: Subcontractors shall provide costs based upon work specified or indicated on Drawings. In addition, Subcontractors shall provide a listing (with prices) for work that in their opinion will need to be accomplished to provide a complete and operational building project. No additional cost(s) will be paid by the Owner that is not identified at the time of bidding.

- G. Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade. In particular, requirements of Division 1 which impact a particular trade (e.g. Section 01 3546 - Indoor Air Quality Management requirements to be performed by the mechanical subcontractor) shall be included in the Work of the applicable subcontractor. The Contract Documents shall be provided to in their entirety to each subcontractor who shall review and identify all of the work that they will perform to the General Contractor. Nothing in this paragraph shall remove the responsibility of the Contractor to supervise, inspect and direct the work in accordance with the General Conditions

1.2 DEFINITIONS PERTAINING TO THE CONTRACT DOCUMENTS

- A. Furnish: To purchase and deliver.
- B. Install: To place into final position and connect.
- C. Provide: To furnish and install.
- D. "As shown", "as detailed", "as indicated" or words of similar import mean as indicated on the drawings
- E. "As selected", "as approved" or words of similar import mean as selected by, as approved by, or as accepted by the Resident Engineer.
- F. "Approved equal", "or equal" shall mean as approved and accepted by the Resident Engineer.
- G. "Shall" means mandatory.
- H. "As required" means as required by the contract documents.
- I. "As necessary" means essential to the completion of the work.
- J. "Concealed" means not visible in the finished work.
- K. "Exposed" means visible in the finished work.
- L. "Days" means working days.
- M. Substantial Completion: That stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

1.3 WORK BY OWNER

- A. Items noted 'NIC' (Not in Contract) will be furnished and installed by Owner.

1.4 OWNER FURNISHED ITEMS

- A. Products furnished to the site and paid for by Owner shall be as noted on Drawings.
- B. Owner's Responsibilities:
 - 1. Arrange for and deliver Owner reviewed Shop Drawings, Product Data, and Samples, to Contractor.
 - 2. Arrange and pay for product delivery to site.

3. On delivery, inspect products jointly with Contractor.
4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
5. Arrange for Manufacturers' warranties, inspections and service.

C. Contractor's Responsibilities:

1. Contractor shall give Owner written notice stating dates when Owner-furnished items must be received at the job site to insure Project completion in accordance with established schedule.
2. Review Owner-reviewed Shop Drawings, Product data, and Samples
3. Receive and unload products at site; inspect for completeness or damage, jointly with Owner.
4. Handle, store, assemble, install, connect and finish such products, including furnishing lubricants and fluids and procedures required to render product serviceable and operative.
5. Contractor is responsible for the coordination and interface of Owner-Furnished and Installed work with Work of this Contract to provide all required mechanical and electrical rough-ins, openings, supports, dimensions, etc., as required for a complete installation

1.5 CONTRACTOR USE OF SITE

- A. General: Contractor shall have full use of the site within Contract Limit Lines indicated for construction operations during the construction period.

1.6 PERMITS, FEES AND NOTICES

- A. Plan check fees have been paid by the Owner.
- B. The Contractor shall secure and pay for the building permit and for other permits and governmental fees, licenses and special inspections, (see also Volume 1 – Special Provisions.
- C. The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations and lawful orders of public authority bearing on the performance of the Work.
- D. It is not the responsibility of the Contractor to make certain that the Contract Documents are in accordance with applicable laws, statutes, building codes and regulations. If the Contractor observes that any of the Contract Documents are at variance therewith in any respect, he shall promptly notify the Resident Engineer in writing, and any necessary changes shall be accomplished by appropriate Modification.
- E. If the Contractor performs Work knowing it to be contrary to such laws, ordinances, rules and regulations, and without such notice to the Resident Engineer, the Contractor shall assume full responsibility there for and shall bear attributable costs.

1.7 SPECIAL SITE AND PROJECT CONDITIONS

- A. Contractor shall ensure that exposed piping, valves, connections, drains and apparatus of any kind shall be fully reviewed and coordinated with the Resident Engineer.
 - 1. Exposed sprinkler heads shall typically be placed in the center of the ceiling tile or pattern.
 - 2. The shop drawings shall explicitly cloud all exposed conditions and shall be reviewed, authorized and initialed by the Resident Engineer prior to installation.
 - a. The purpose of this review is to ensure that all components of this system are placed in as discrete and as minimally impacting a location as possible.
 - b. Failure by the fire sprinkler system designer/subcontractor to point out and secure Resident Engineer review and written approval of all exposed conditions shall result in relocation of any exposed items as directed by the Resident Engineer at no additional cost to the owner.
 - 3. Contractor shall ensure that hangers, supports, pipes, braces to be hung true and vertical (neat and clean) where exposed to view.
- B. Additional time required by Architect & Architect's consultants due to negligence of General Contractor and/or Subcontractor shall be paid for by General Contractor (through the Resident Engineer) per their hourly rates.

1.8 APPROVED APPLICATORS

- A. Where specific instructions in the Specifications require that a particular product and/or material be applied and/or installed by an "approved applicator" it shall be the Contractor's responsibility to insure that any Subcontractor or Subsubcontractor used for such Work is in fact currently certified by the particular Manufacturer for this type of installation or application.

1.9 APPROVED MANUFACTURERS

- A. Each Section includes a list of Manufacturers whose equipment is acceptable as to manufacture, subject to conformance with the Contract Documents. Careful checking must be made by the Contractor and the manufacturer or equipment supplier to verify that the equipment will meet all capacities, requirements, space allocations and is suitable to the intended purpose.

1.10 REFERENCE DATA

- A. The Contractor shall establish and maintain all buildings and construction grades, lines, levels, and bench marks. (See also Volume – Special Provisions)

1.11 ARCHITECTURAL BARRIERS

- A. It is the desire of the Owner that the facilities and improvements constructed under this Contract meet or exceed the intent of applicable public law concerning prohibition of discrimination, and that no individual be discriminated against on the basis of disability in the full and equal enjoyment of the goods, services, facilities, privileges, advantages, or accommodations of this completed Project. The designers and drafters of these Documents have intended to incorporate those Owner's intentions into these Documents.
- B. It is recognized that there may be products not incorporated into these Documents that may more nearly meet the Owner's desires than those included.

- C. The Owner hereby solicits those providing elements of this Project to bid and contract for the Project as required by these Documents, but at the time of submitting Shop Drawings, or sooner when appropriate, and without causing delay in the Project, to also submit proposals for improving the accessibility of the Project to physically or mentally impaired persons.

1.12 WEATHER TIGHT - WATER PROOF

- A. The Contractor shall be responsible for providing weather tight - water proofed building regardless if there are no drawings/details describing particular areas of the buildings.

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SECTION 01 26 13

CONTRACTOR'S REQUESTS FOR INFORMATION /INTERPRETATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Administrative requirements for requests for information / interpretation.

1.2 DEFINITIONS

- A. Request For Information / Interpretation (RFI):
1. A document submitted by the Contractor requesting clarification of a portion of the Contract Documents, hereinafter referred to as RFI.
 2. A properly prepared request for information / interpretation shall include a detailed written statement that indicates the specific Drawings or Specification in need of clarification and the nature of the clarification requested.
 - a. Drawings shall be identified by drawing number and location on the drawing sheet.
 - b. Specifications shall be identified by Section number, page and paragraph.
 3. Requests for Information: Request made by Contractor concerning items not indicated on drawings or contained in Technical Specifications that is required to properly perform the work.
- B. Improper RFI's:
1. RFI's that are not properly prepared.
 2. Improper RFI's will be processed by the Resident Engineer with the Architect at the Architect's standard hourly rate and Architect will charge the Owner, and such costs will be deducted from monies still due the Contractor. The Contractor will be notified by the Resident Engineer prior to the processing of improper RFI's.
- C. Frivolous RFI's:
1. RFI's that request information that is clearly shown on the Contract Documents.
 2. Frivolous RFI's may be returned unanswered or may be processed by the Resident Engineer with the Architect at the Architect's standard hourly rate and Architect will charge the Owner, and such costs may be deducted from monies still due the Contractor. The Contractor will be notified by the Architect and Resident Engineer prior to the processing of frivolous RFI's.

1.3 CONTRACTOR'S REQUESTS FOR INFORMATION

- A. RFI's shall be submitted on Document included in the Technical Specifications.
1. Forms shall be completely filled in, and if prepared by hand, shall be fully legible after photocopying or transmission by facsimile (fax).
 2. RFI's shall be submitted in numerical order with no breaks in the consecutive numbering.
 3. Each page of attachments to RFI's shall bear the RFI number and shall be consecutively numbered in chronological order.
 4. RFI's may be submitted by E-Mail.
 - a. Submittal by E-Mail is the preferred method of submittal.
 - b. Address for E-Mail will be distributed by the Resident Engineer at the Pre-Construction Conference.

- B. When the Contractor is unable to determine from the Contract Documents, the material, process or system to be installed, the Resident Engineer shall be requested to make a clarification of the indeterminate item.
 - 1. Wherever possible, such clarification shall be requested at the next appropriate project meeting, with the response entered into the meeting minutes. When clarification at the meeting is not possible, either because of the urgency of the need, or the complexity of the item, Contractor shall prepare and submit an RFI to the Resident Engineer.
- C. RFI's shall be originated by the Contractor.
 - 1. RFI's from subcontractors or material suppliers shall be submitted through, reviewed by, and signed by the Contractor prior to submittal to the Resident Engineer.
 - 2. RFI's from subcontractors or material suppliers sent directly to the Resident Engineer shall not be accepted and will be returned unanswered..
- D. Contractor shall carefully study the Contract Documents to assure that the requested information is not available therein. RFI's which request information available in the Contract Documents will be deemed either "improper" or "frivolous" and returned.
- E. RFI's shall not be used for the following purposes:
 - 1. To request approval of submittals
 - 2. To request approval of substitutions,
 - 3. To request changes which are known to entail additional cost or credit. (A Change Order Request form shall be used.)
 - 4. To request different methods of performing work than those drawn and specified.
- F. In the event the Contractor believes that a clarification by the Resident Engineer results in additional cost or time, Contractor shall not proceed with the work indicated by the RFI until a Change Order (or Construction Change Directive, if applicable to project) is prepared and approved. RFI's shall not automatically justify a cost increase in the work or a change in the project schedule.
 - 1. Answered RFI's shall not be construed as approval to perform extra work.
 - 2. Unanswered RFI's will be returned with a stamp or notation: Not Reviewed.
- G. Contractor shall prepare and maintain a log of RFI'S, and at any time requested by the Resident Engineer, Contractor shall furnish copies of the log showing outstanding RFI'S. Contractor shall note unanswered RFI's in the log.
- H. Contractor shall allow up to 20 working days review and response time for RFI'S.
 - 1. The Resident Engineer and Architect will endeavor to respond in a timely fashion to RFI's.
 - 2. RFI shall state requested date/time for response, however, this requested date/time for response is not a guarantee that the RFI will be answered by that date/time if that date/time is too expeditious

PART 2 PRODUCTS

Not applicable.

PART 3 EXECUTION

Not applicable.

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SECTION 01 31 19
PROJECT MEETINGS

PART 1 GENERAL

1.1 GENERAL

- A. See Volume 1 – Special Provisions and Whitebook.

1.2 PRECONSTRUCTION CONFERENCE

- A. A Preconstruction Conference to discuss the Project work will be held at a time and location designated by the Resident Engineer.
- B. Contractor, and representatives of major Subcontractors, shall meet with Owner and Architect. The purpose of this conference is to discuss the Project in detail, including scheduling of Work, and to answer questions. Unless followed up in writing, verbal authorizations or acknowledgement of those present are not binding.
- C. Meeting minutes will be taken by the Resident Engineer.
- D. LEED™ requirements as specified in Section 01 81 13 shall be reviewed during this conference.

1.3 PROGRESS MEETINGS

- A. At time designated by Resident Engineer, bi-weekly Progress Meeting will be held at Project site.
- B. Contractor and representatives of major Subcontractors shall meet with Resident Engineer.
- C. Contractor is responsible for notifying Subcontractors of their required attendance. These meetings will address progress of the Work and problems that may have developed since the previous meeting.
- D. LEED™ requirements as specified in Section 01 81 13 shall be reviewed with the various subcontractors as applicable to the stage of the work and during each progress meeting.

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SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 GENERAL

- A. See Volume 1 – Special Provisions and Green Book.

1.2 CONSTRUCTION SCHEDULE

- A. Submit 6 copies of the Construction Schedule within 35 calendar days after Notice to Proceed, broken down by Trade or Material, to the Resident Engineer for approval prior to the first Progress Payment Request. Schedule shall be by Critical Path Method (CPM) or bar graph type, and shall show proposed starting and completion dates for each Trade and activity for the Work. Submit 6 copies of updated schedule at each Progress Payment Request field review to the Resident Engineer.
- B. Submit completed construction schedule to Resident Engineer no later than 35 calendar days after Notice to Proceed and update monthly during construction. Submit current schedule with each application for payment.
- C. Submit completed material delivery schedule to the Resident Engineer no later than 35 calendar days after the date of the Notice to Proceed. Identify material critical to the progress of the Project and those for which long lead time in procurement is anticipated. Indicate projected dates for submittal, order and delivery of such material.

1.3 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- A. Shop Drawings: (See also Volume 1 – Special Provisions and Green Book.).
 - 1. Following Contractor's review and approval, submit shop drawings to the Resident Engineer for review.
 - a. Electronic (PDF format only) submittal transmitted via e-mail is preferred.
 - b. Shop drawings submitted electronically will be reviewed and returned electronically.
 - 2. Full sized scaled (24 inch by 36 inch) drawings on paper (minimum 6 sets) shall be provided for the following to allow for Architect's redline:
 - a. Door details and elevations.
 - b. Window details and elevations.
 - c. Steel framing.
 - d. Reinforcing in foundations.
 - e. Millwork/casework details and elevations.
 - f. Solid Composite Exterior Wall Panels details and elevations
 - 3. The Resident Engineer will review the Drawings and affix a stamp indicating the findings of the review, and will return same to the Contractor.
 - 4. Comments, if any, will be noted directly on the electronic copy or on a copy of the full sized scaled drawings on paper.
 - 5. The Contractor shall distribute the appropriate number of copies to the various Trades and to Contractor's job personnel as required.
 - 6. Fire Alarm System/Fire Sprinklers System Shop Drawings shall be submitted to Resident Engineer prior to submittal to the state and local Fire Marshal for approval. Obtain approval prior to installation. Fire Marshal inspection, test and approval of completed installations shall be obtained prior to acceptance of the systems and Substantial Completion of the Project.

7. Provide shop drawings for all exterior cladding, rain screen construction and associated flashing indicating materials and methods to be used to ensure building is protected from water migration and condensation.
- B. Product Data: Following Contractor's review and approval, submit to the Resident Engineer copies of Manufacturer's catalogs and brochures as required by the Specifications. Resubmit corrected copies for approval in accordance with original submittal.
- C. Samples:
1. Following Contractor's review and approval, submit to the Resident Engineer samples of materials in quantities and sizes as required by the Specifications.
 2. Submittals required other than for selection of color, texture, fabric or finish shall be given to the Resident Engineer at a time determined by the Contractor, which will allow for resubmittal and which will not cause and delay in the Work.
 3. Corrected samples shall be resubmitted for approval as per the original submittal.
- D. Color Selection: Within 30 days of the date of Agreement, submit to the Architect for approval, samples and appropriate information required for the selection of colors, textures, fabric and finishes for the entire Project. Final selection of color, textures, fabrics or finishes will not be made until all applicable and related submittals have been provided. If the Contractor fails to provide the required samples and related information within the time period, the Architect shall have the option of selecting colors, textures, fabric, finishes or specific materials from those specified or approved and the Contractor shall be obligated to provide the material selected by the Architect.
- E. Submit Shop Drawings and Samples for only those items specifically mentioned in the Specifications. Contractor shall be responsible for obtaining Shop Drawings required for the progress of the Work, even though such Shop Drawings may not require the Resident Engineer's review.
- F. Partial Submittals: Submittals which are partial or contain only a portion of the data required to describe the item or installation will be rejected, unless such partial submittal is coordinated with the Resident Engineer prior to submittal, and final approval of all such items will be withheld pending receipt of all required information.
- G. Deviations: All deviations from the Contract Documents shall be clearly identified in the submittal. Submittal shall include only items included in the specifications or which have been approved in advance by the Resident Engineer in accordance with requirements of Section 01 60 00. Submittals containing items which have not been approved in advance by the Resident Engineer will be rejected.
- H. Environmentally Sensitive Materials (Green Products):
1. Specifications are based upon the use of environmentally sensitive materials.
 2. In some cases, manufacturer's standard products may contain materials that do not comply with specified requirements for the usage of environmentally sensitive materials and compliance with the specified requirements may not be possible.
 3. Contractor shall submit product data electronically for products that are proposed for use that do not comply with specified requirements for the usage of environmentally sensitive materials.
 4. Owner reserve the right to disapprove the submittal (and subsequent usage) for products that are proposed for use that do not comply with specified requirements for the usage of environmentally sensitive materials.

1.4 QUALITY CONTROL SUBMITTALS

- A. Equipment Lists: Following Contractor's review and approval, submit to the Resident Engineer 6 complete lists of major items of mechanical, plumbing and electrical equipment and materials, within 30 calendar days after date of Agreement. Submit all items at one time. Partial list will not be acceptable. Submittals shall include the Manufacturer's Specifications, weights, space requirements, physical dimensions, rating of equipment and supplemental information requested by the Resident Engineer. Submit performance curves for pumps and fans. Where a submittal sheet describes items in addition to that item being submitted, delete such items. Clearly note equipment and materials which deviate from those shown or specified in size, weight, required clearances, and location of access. Modifications to the Work as shown or specified in submittals shall be indicated and shall be provided by the Contractor as a part of the Work.
- B. Manufacturer's Instructions: Where Specifications require Work to be furnished, installed or performed in accordance with a specified product Manufacturer's instructions, distribute copies of such instructions to concerned parties.
- C. Manufacturers' standard dimension drawings and performance and product data shall be edited to delete reference to equipment, features, or information that is not applicable to the equipment being supplied for this project.
- D. Provide sufficient copies of approved data, with the engineers approved stamp for inclusion in the operation and maintenance manuals as specified in Section 01 91 00 - Commissioning.
- E. Flame Spread Ratings: For each finish material, provide manufacturer's brochures and approved testing agency report for finishes to verify compliance with flame spread ratings set forth in IBC 404 and IBC Chapter 8.

1.5 LEED SUBMITTALS

- A. Prior to start of construction: The following shall be submitted a minimum of 15 calendar days prior to the start of construction for review and acceptance.
 - 1. Construction IAQ Management Plan as specified in Section 01 35 46 - Indoor Air Quality Management.
 - 2. Sedimentation and Erosion Control (ESC) Plan as specified in Section 01 57 13 - Temporary Erosion and Sediment Control shall be submitted for approval prior to commencement of demolition or construction activities on the project site.
- B. Prior to installation of products: The following shall be submitted a minimum of 7 calendar days prior to the installation of the applicable product.
 - 1. Product Form:
 - a. Prior to installation of a product into the work, submit a completed form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification.
 - b. Product data sheets and other supporting documentation shall be included.
 - c. Submit product form, product data sheets, other supporting documentation and low emitting materials forms in electronic form as PDF documents.
 - d. Information contained on the Product Form shall be used to complete the information required for the LEED Submission.

- C. During the course of construction:
 - 1. Summary of Project Waste Generated in accordance with Section 01 74 19.
 - 2. Items required by Owner or Architect as identified in the Environmental Protection Plan in accordance with Section 01 35 43.
 - 3. Other pertinent items required by the Owner or Architect and identified during the Pre-Construction Conference or subsequent Project Meetings.

- D. Prior to Substantial Completion:
 - 1. Provide the submittals related to construction IAQ management as specified in Section 01 35 46 - Indoor Air Quality Management.:

END OF SECTION

SECTION 01 35 43

ENVIRONMENTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Procedures for achieving the most environmentally conscious Work feasible within the limits of the Construction Schedule, Contract Sum, and available materials, equipment, and products.
1. Participate in promoting efforts of Owner and Architect to create an energy-efficient and environmentally sensitive structure.
 2. Use recycled-content, toxic-free, and environmentally sensitive materials, equipment, and products.
 3. Use environmentally sensitive procedures.
 - a. Protect the environment, both on-site and off-site, during demolition and construction operations.
 - b. Prevent environmental pollution and damage.
 - c. Effect optimum control of construction waste.
- B. Related Sections:
1. Section 01 31 19 - Project Meetings: Preconstruction conference.
 2. Section 01 33 00 - Submittal Procedures: Submittals for "non-green" products.
 3. Section 01 35 46 - Indoor Air Quality Management
 4. Section 01 60 00 - Product Requirements Product substitution procedures.
 5. Section 01 74 19 - Construction Waste Management: Waste collection, and disposal operations.
 6. Section 01 77 00 - Closeout Procedures: Cleaning and final submittals.
 7. Section 01 81 13 - Sustainable Design Requirements: Procedures required of the Contractor to ensure that construction procedures and documentation required for US Green Building Council LEED Certification are provided.
 8. Section 02 41 00 - Demolition: Salvage and waste disposal operations.
- C. See also CAL-GREEN requirements on Drawings Sheet T-3.0 - T3.3

1.2 SUBSTITUTIONS

- A. Notify Owner when Contractor is aware of materials, equipment, or products that meet the aesthetic and programmatic intent of Contract Documents but are more environmentally sensitive than materials, equipment, or products specified or indicated in the Contract Documents.
- B. Substitution requirements of Section 01 60 00, apply except as follows:
1. Prior to submitting detailed information required under Section 01 60 00, submit the following for initial review by Resident Engineer:
 - a. Product data including manufacturers name, address, and phone number.
 - b. Description of the differences of the proposed substitution from specified product. Include description of environmental advantages of proposed substitution over specified product.
 - c. MSDS Sheets (for information only, not for verification of conformance under OSHA requirements.)
 2. Submit additional information as directed by Resident Engineer.

1.3 PRECONSTRUCTION MEETING

- A. At the preconstruction meeting specified in Section 01 31 19 – Project Meetings, discuss the proposed Construction Waste Management and Environmental Protection Plan and develop a mutual understanding relative to details of environmental protection, recycling, and rebate programs.

1.4 SUBMITTALS

- A. Construction Waste Management Plan: In accordance with Section 01 74 19-- Construction Waste Management.
- B. Environmental Protection Plan:
 - 1. List of federal, state, and local laws, regulations, and permits concerning environmental protection, environmental pollution and damage, hazardous materials, construction and demolition waste, chemical waste, sanitary waste, sediment, water, air, and noise pollution that are applicable to the Contractor's proposed operations.
 - 2. List species of fish and wildlife (as applicable to this project) that require specific attention, along with measures for their protection.
 - 3. Procedures to be implemented to provide the required environmental protection and to comply with the applicable laws and regulations. Document existing conditions.
 - 4. Procedures for Recycling/Reuse Program, including:
 - a. Name, location, and phone number.
 - b. Copy of permit or license for each facility.
- C. Environmental Cleaning Plan: Submit cleaning / housekeeping policies and environmental cleaning solution product data sheets.
 - 1. Provide written program for training and implementation.
 - 2. Provide written plan for integrating the Green Housekeeping program into the overall project Environmental Protection Plan
 - 3. Material Safety Data Sheets (MSDS) on chemicals approved for use within the building.
 - 4. Develop list of approved and prohibited chemicals and practices.

1.5 QUALITY ASSURANCE

- A. Regulatory requirements:
 - 1. Cleaning materials and methods shall meet federal mandates including Executive Order 13101 on Greening the Government through Waste Prevention, Recycling and Federal Acquisition and Section 23.703 of the Federal Acquisition Regulation which requires federal agencies to consider environmental factors when purchasing products and services.
 - 2. Comply with the criteria of Green Seal standard GS-37 (see www.greenseal.org) OR California Code of Regulations, Title 17 Section 94509, VOC standards for cleaning products (go to www.calregs.com, click on "California Code of Regulations" and perform a keyword search for "94509").

PART 2 PRODUCTS

2.1 MATERIALS

- A. Furnish environmentally responsible materials as defined above and as specified in the various specification sections of these Technical Specifications.

- B. Cleaning Materials:
 - 1. Utilize non-hazardous chemicals that have no or greatly reduced impacts upon the environment.
 - 2. Provide Green Seal approved ENVIRCARE chemical line, which consists of products that are non-hazardous and have a low environmental impact.
 - 3. Utilize concentrated cleaning products when available.

PART 3 EXECUTION

3.1 ENVIRONMENTAL GOALS IMPLEMENTATION

- A. Contractor shall designate an on-site party (or parties) responsible for overseeing the Environmental Goals for the project and instructing workers and subcontractors in the means and methods of achieving those goals.
- B. Distribution: The Contractor shall distribute copies of the Environmental Goals to the Job Site Foreman, each Subcontractor, and the Resident Engineer.
- C. Meetings: Contractor shall discuss the implementation of the Environmental Goals at the following meetings:
 - 1. Partnering meeting.
 - 2. Pre-construction meeting.
 - 3. Progress meetings.

3.2 RECYCLING AND REUSE

- A. See Section 01 74 19 - Construction Waste Management.

3.3 ENVIRONMENTAL CONTROLS

- A. Protection of natural resources: Preserve the natural resources within the project boundaries and outside the limits of permanent work performed under this Contract in their existing condition or restore to an equivalent or improved condition as approved by Owner, upon completion of the Work.
 - 1. Confine demolition and construction activities to work area limits indicated on the Drawings.
 - a. Temporary construction: As specified in Section 01 50 00.
 - b. Salvage operations: As specified in Section 02 41 00.
 - c. Disposal operations for demolished and waste materials that are not identified to be salvaged, recycled, or reused:
 - 1) Remove debris, rubbish, and other waste materials resulting from demolition and construction operations from site.
 - 2) No burning permitted.
 - 3) Transport materials with appropriate vehicles, and dispose off-site to areas that are approved for disposal by governing authorities having jurisdiction.
 - 4) Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways. Remove spillage, and sweep, wash, or otherwise clean project site, streets, or highways.
 - 5) Comply with applicable regulations.

2. Land resources: Prior to construction, identify land resources to be preserved within the Work area. Do not remove, cut, deface, injure, or destroy land resources, including trees, shrubs, vines, grasses, topsoil, and land forms without permission from Owner.
 - a. Earthwork: As specified in Section 31200 – Earthwork for Structures and Pavements and as follows:
 - 1) Erodible soils: Plan and conduct earthwork to minimize the duration of exposure of unprotected soils, except where the constructed feature obscures borrow areas, quarries, and waste material areas. Clear areas in reasonably sized increments only as needed to use the areas developed. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.
 - 2) Erosion and sedimentation control devices: Construct or install temporary and permanent erosion and sedimentation control features as required.. Provide "biofence" (www.biofence.com), hay bales or other methods as required to provide silt control into adjacent washes, creeks, rivers, lakes and other wetlands as directed by Resident Engineer and/or Civil Engineer. See Section 01 57 13 – Temporary Erosion and Sediment Control for additional requirements.
 - b. Tree and plant protection: Prior to start of construction, tag each tree and plant scheduled to remain with value as identified by Owner. In the event of damage to tree or plant, Owner may, at Owner's discretion, deduct the indicated value of the damaged tree or plant from the Contract Sum.
3. Air Resources: Prevent creation of dust, air pollution, and odors.
 - a. Use water sprinkling, temporary enclosures, and other appropriate methods to limit to lowest practical level dust and dirt rising and scattering in air.
 - 1) Dust mitigation shall be as required by local Environmental Health Department.
 - 2) Do not use water when it may create hazardous or other adverse conditions such as flooding and pollution.
 - b. Store volatile liquids, including fuels and solvents, in closed containers.
 - c. Properly maintain equipment to reduce gaseous pollutant emissions.
 - d. Interior final finishes: Schedule construction operations involving wet products prior to packaged dry products to the greatest extent possible, in accordance with approved Construction Waste Management and Environmental Protection Plan.
 - e. Temporary Ventilation: As specified in Section 01 50 00—Temporary Facilities and Controls, and as follows:
 - 1) Provide adequate ventilation during and after installation of interior wet products and interior final finishes.
 - 2) Provide adequate ventilation of packaged dry products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degree F maximum continuously during the ventilation period. Do not ventilate within limits of Work unless otherwise approved by Resident Engineer.
 - 3) Preoccupancy ventilation: After final completion and prior to initial occupancy, provide adequate ventilation for minimum five days. Preoccupancy ventilation procedures:
 - a) Use supply air fans and ducts only.
 - b) Temporarily seal exhaust ducts.

- c) Temporarily disable exhaust fans.
- d) Provide exhaust through operable windows or temporary openings.
- e) Provide temporary exhaust fans as required to pull exhaust air from deep interior locations. Stair towers may be used for exhausting air from the building during the temporary ventilation.
- f) After preoccupancy ventilation and prior to final testing and balancing of HVAC system, replace air filters and make HVAC system fully operational.

3.4 INDOOR AIR QUALITY

- A. See Section 01 81 13 – Sustainable Design Requirements for requirements relating to Indoor Environmental Quality (EQ) Prerequisite No. 1 - Minimum IAQ Performance.
- B. Verify ventilation requirements for indoor air quality. "Adequate" requirements for one material may not be "adequate" for another; for example, carpet can contain over 100 chemicals, including possible carcinogens, and may require more complex ventilation to accelerate off gassing prior to installation. Materials/products that generally require temporary ventilation for off gassing include:
 - 1. adhesives
 - 2. wood preservatives
 - 3. composite wood products
 - 4. plastics
 - 5. waterproofing
 - 6. insulation
 - 7. fireproofing
 - 8. sealants/caulking
 - 9. acoustical ceilings
 - 10. resilient flooring
 - 11. carpet
 - 12. painting
 - 13. sealers/coatings
 - 14. wall coverings
 - 15. manufactured casework
 - 16. furniture

END OF SECTION

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SECTION 01 35 46

INDOOR AIR QUALITY MANAGEMENT

PART 1 GENERAL

1.1 CONSTRUCTION IAQ MANAGEMENT PLAN (LEED EQ Credit No. 3.1)

- A. Not applicable to this Project.

1.2 CONSTRUCTION IAQ MANAGEMENT PLAN (LEED EQ Credit No. 3.2)

- A. Contractor shall develop an Indoor Air Quality (IAQ) Management Plan and implement it after all finishes have been installed and the building has been completely cleaned before occupancy. The IAQ Management Plan shall include either a building flush out (option 1) or air quality testing (option 2).
- B. Flush-out (Option 1): In conjunction with the Architect and the Mechanical Engineer, develop and implement an Indoor Air Quality (IAQ) Management Plan for pre-occupancy phase **per one of the following**:
1. After construction ends, prior to occupancy and with all interior finishes installed, install new MERV 13 filters in air handling units and perform a building flush-out by supplying a total air volume of 14,000 cu. ft. of outdoor air per sq. ft. of floor area while maintaining an internal temperature of at least 60 degrees F and relative humidity no higher than 60%. After the flush out, inspect filters and replace if needed with MERV 13 and return the HVAC system to its normal operational mode.
 2. If occupancy is desired prior to completion of the flush-out (and upon completion of construction with all interior finishes installed and new MERV 13 filters in air handling units), the space may be occupied following delivery of a minimum of 3,500 cu. ft. of outdoor air per square foot of floor area to the space. Once a space is occupied, it shall be ventilated as a minimum rate of 0.30 cfm / sq.ft. of outside air or the design minimum outside air rate determined by EQ Prerequisite 1, whichever is greater. During each day of the flush-out period, ventilation shall begin a minimum of 3 hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14,000 cu. ft./sq. ft. of outside air has been delivered to the space. After the flush out, inspect filters and replace if needed with MERV 13 and return the HVAC system to its normal operational mode.
- C. Air Quality Testing (Option 2):
1. Conduct baseline indoor-air-quality testing, after construction ends and prior to occupancy, using testing protocols consistent with the EPA's "Compendium of Methods for the Determination of Air Pollutants in Indoor Air," and as additionally detailed in the USGBC's "Green Building Design and Construction Reference Guide."
 2. Demonstrate that the contaminant maximum concentrations listed below are not exceeded:
 - a. Formaldehyde: 27 ppb.
 - b. Particulates (PM10): 50 micrograms/cu. m.
 - c. Total Volatile Organic Compounds (TVOC): 500 micrograms/cu. m.
 - d. 4-Phenylcyclohexene (4-PH): 6.5 micrograms/cu. m.
 - e. Carbon Monoxide: 9 ppm and no greater than 2 ppm above outdoor levels.

3. For each sampling point where the maximum concentration limits are exceeded, conduct additional flush-out with outside air and retest the specific parameter(s) exceeded to indicate the requirements are achieved. Repeat procedure until all requirements have been met. When retesting non complying building areas, take samples from same locations as in the first test.
4. Air-sample testing shall be conducted as follows:
 - a. All measurements shall be conducted prior to occupancy but during normal occupied hours, and with building ventilation system starting at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the airtesting.
 - b. Building shall have all interior finishes installed including, but not limited to, millwork, doors, paint, carpet, and acoustic tiles. Nonfixed furnishings such as workstations and partitions are encouraged, but not required, to be in place for the testing.
 - c. Number of sampling locations varies depending on the size of building and number of ventilation systems. For each portion of building served by a separate ventilation system, the number of sampling points shall not be less than one per 25,000 sq. ft. or for each contiguous floor area, whichever is larger, and shall include areas with the least ventilation and greatest presumed source strength.
 - d. Air samples shall be collected between 3 and 6 feet from the floor to represent the breathing zone of occupants, and over a minimum four-hour period.

END OF SECTION

SECTION 01 42 00

REFERENCES

1.1 QUALITY ASSURANCE

- A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date of Contract Documents.
- C. Obtain copies of standards when required by Contract Documents.
- D. Should specified reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- E. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.2 SCHEDULE OF REFERENCES

AA	Aluminum Association 900 19th St. N.W., Suite300 Washington, DC 20006 www.aluminum.org	(202) 862-5100
AABC	Associated Air Balance Council 1518 K. Street, N.W. Washington, DC 20005 www.aabchg.com	(202) 737-0202
AACPA	Autoclaved Aerated Concrete Product Association 3701 C.R. 544 E Haines City, FL 33844 www.aacpa.org	(863) 419-2058
AAMA	American Architectural Manufacturers Association 1540 E. Dundee Rd., Suite310 Palatine, IL 6067-8321 www.aamanet.org	(847) 303-5664
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, N.W., Suite249 Washington, DC 20001 www.aashto.org	(202) 624-5800
ACI	American Concrete Institute P. O Box 9094 Farmington Hills, MI 48999-9094 www.aci-net.org	(248) 848-3700
ADC	Air Diffusion Council 230 North Michigan Avenue Chicago, IL 60601 www.flexibleduct.org	(312) 201-0101

AFPA	American Forest and Paper Association (Formerly: National Forest Products Association) 1111 19 th St., NW, Suite 800 Washington, DC 20036 www.afandpa.org	(202) 463-2700
AI	Asphalt Institute 2696 Research Park Dr P.O. Box 14052 Lexington, KY 40512-4052 www.asphaltinstitute.org	(606) 288-4960
AIA	American Institute of Architects 1735 New York Avenue, N.W. Washington, DC 20006-5292 www.aia.org	(202) 626-7300
AISC	American Institute of Steel Construction 1 E. Wacker Dr., Suite 3100 Chicago, IL 60601 www.aisc.org	(312) 670-2400
AISI	American Iron and Steel Institute 1101 17th Street, N.W., Suite 1300 Washington, DC 20036 www.steel.org	(202) 452-7133
AITC	American Institute of Timber Construction 7012 S. Revere Pky, Suite 140 Englewood, CO 80112 www.aitc-qlulam.org	(303) 792-9559
AMCA	Air Movement and Control Association 30 West University Drive Arlington Heights, IL 60004 www.amca.org	(847) 394-0150
ANSI	American National Standards Institute 11 West 42nd Street, 13 th Fl New York, NY 10036 www.ansi.org	(212) 642-4900
APA	Engineered Wood Association (Formerly: American Plywood Association) P.O. Box 11700 Tacoma, WA 98411 www.apawood.org	(253) 656-6600
API	American Petroleum Institute 1220 L Street, N.W. Washington, DC 20005 www.api.org	(202) 682-8000
AQMD	Air Quality Management District 21865 E. Copley Drive Diamond Bar, CA 91765 www.aqmd.gov	(909) 396-2000
ARI	Air-Conditioning and Refrigeration Institute 4301 N. Fairfax Dr., Suite 425 Arlington, VA 22203 www.ari.org	(703) 524-8800

ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 1791 Tullie Circle, N.E. Atlanta, GA 30329 www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017 www.asme.org	(800) 843-2763 (973) 882-1167
ASTM	American Society for Testing and Materials 100 Barr Harbor Dr West Conshohocken, PA 19428 www.astm.org	(610) 832-9585
AWI	Architectural Woodwork Institute 1952 Isaac Newton Square West Reston, VA 20190 www.awinet.org	(703) 733-0600
AWPA	American Wood Preservers Association PO Box 5690 Granbury, TX 76049 www.awpa.com	(817) 326-6300
AWS	American Welding Society 550 NW LeJeune Road Miami, FL 33126 www.amweld.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235 www.awwa.org	(303) 794-7711
BHMA	Builders Hardware Manufacturer's Association 355 Lexington Ave., 17th Floor New York, NY 10017	(212) 661-4261
BIA	Brick Institute of America 11490 Commerce Park Drive Reston, VA 22091 www.bia.org	(703) 620-0010
CDA	Copper Development Association 260 Madison Ave. New York, NY 10016 www.copper.org	(212) 251-7200
CFPC	Certified Forest Products Council 14780 SW Osprey Drive, Suite 285 Beaverton, OR 97007 www.certifiedwood.org	(503) 590-6600
CISCA	Ceilings and Interior Systems Construction Association 1500 Lincoln Highway, Suite 202 St. Charles, IL 60174 www.cisca.org	(630) 584-1919
CLFMI	Chain Link Fence Manufacturers Institute 9891 Broken Land Pkwy, Ste 300 Columbia, MD 21046 www.chainlinkinfo.org	(301) 596-2584

CRI	The Carpet and Rug Institute Box 2048 Dalton, GA 30722-2048 www.carpet-rug.com	(706) 278-3176
CRSI	Concrete Reinforcing Steel Institute 933 Plum Grove Road Schaumburg, IL 60173 www.crsi.org	(847) 517-1200
CSSB	Cedar Shingle and Shake Bureau (Formerly: Red Cedar Shingle and Handsplit Shake Bureau) 515 116th Avenue Bellevue, WA 98004	(425) 453-1323
CTI	Ceramic Tile Institute of America 2061 Jefferson Blvd Culver City, CA 90230 http://www.ctioa.org/	(310) 574-7800
DCAT	Development Center for Appropriate Technology P.O. Box 41144 Tucson, AZ 85717 www.dcat.net	(520) 624-6628
DHI	Door and Hardware Institute 14170 Newbrook Drive Chantilly, VA 20151 www.dhi.org	(703) 222-2010
DOE	U.S. Department of Energy 1000 Independence Ave., SW Washington, DC 20585 http://www.energy.gov	(800) 342-5363
EEBA	Energy and Environmental Building Association 10740 Lyndale Avenue South, 10W, Bloomington, MN 55420-5615 http://www.eeba.org/	(952) 881-1098
EBN	Environmental Building News 122 Birge St., Suite 30 Brattleboro, VT 05301 www.BuildingGreen.com	(802) 257-7300
EJMA	Expansion Joint Manufacturers Association 25 North Broadway Tarrytown, NY 10591 www.ejma.org	(914) 332-0040
EPA	U.S. Environmental Protection Agency 401 M St. W.S. 6202J Washington, DC 20460 www.epa.gov	(202) 775-6650
FSC	Forest Stewardship Council - U.S. 1155 30th Street NW Suite 300 Washington, DC 2007 www.fscus.org	(877) 372-5646

FM	FM Global (Formerly: Factory Mutual System) 1151 Boston-Providence Turnpike P.O. Box 688 Norwood, MA 02062 www.factorymutual.com	(781) 762-4300
GA	Gypsum Association 125 S Franklin St Chicago, IL 60606 www.usg.com	(312) 606-4000
GANA	Glass Association of North America (Formerly: Flat Glass Marketing Association) 3310 SW Harrison St Topeka, KS 66611 www.glasswebsite.com/gana	(785) 266-7013
GBCI	Green Building Certification Institute 2101 L Street NW, suite 650 Washington, DC 20037 www.gbci.org	(800) 795-1746
ICC	International Code Council <i>Headquarters</i> 5203 Leesburg Pike, Suite 600 Falls Church, VA 22041 <i>Los Angeles District Office</i> 5360 S. Workman Mill Road Whittier, CA 90601 http://www.iccsafe.org/	703-931-4533 800-284-4406
IEEE	Institute of Electrical and Electronics Engineers 3 Park Ave 17 th Floor New York, NY 10016 www.ieee.org	(212) 419-7900
ISRI	Institute of Scrap Recycling Industries 1325 G St. NW, Suite 1000 Washington, DC 20005-3104 www.isri.org	(202) 737-1770
MBMA	Metal Building Manufacturer's Association 1300 Sumner Ave. Cleveland, OH 44115	(216) 241-7333
MIL	Military Specification Naval Publications and Forms Center 5801 Tabor Avenue Philadelphia, PA 19120	
ML/SFA	Metal Lath/Steel Framing Association (A Division for the NAAMM) 8 South Michigan Ave., Suite 1000 Chicago, IL 60603	(312) 456-5590
NAAMM	National Association of Architectural Metal Manufacturers 8 South Michigan Ave, Suite 1000 Chicago, IL 60603 www.naamm.org	(312) 456-5590

NCMA	National Concrete Masonry Association 2302 Horse Pen Rd. Herndon, VA 22071 www.ncma.org	(703) 713-1900
NEBB	National Environmental Balancing Bureau 8575 Grovemont Circle Gaithersburg, MD 20877 www.nebb.org	(301) 977-3698
NEMA	National Electrical Manufacturers Association 1300 N 17 th St, Ste 1847 Rosslyn, VA 22209 www.nema.org	(703) 841-3200
NFPA	National Fire Protection Association 1 Battery March Park Quincy, MA 02269 www.nfpa.org	(800) 344-3555 (617) 770-3000
NRCA	National Roofing Contractors Association 10255 W. Higgins Rd., Suite 600 Rosemont, IL 60018 www.roofonline.org	(847) 299-9070
NTMA	National Terrazzo and Mosaic Association 110 E Market St, Ste 200A Leesburg, VA 20176 www.ntma.com	(800) 323-9736 (703) 779-1022
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077 www.portcement.org	(847) 966-6200
PCI	Precast/Prestressed Concrete Institute 209 W. Jackson Blvd Chicago, IL 60606 www.pci.org	(312) 786-0300
PDCA	Painting and Decorating Contractors of America 3913 Old Lee Hwy., Suite 33B Fairfax, VA 22030 www.pdca.com	(703) 359-0826
PS	Product Standard U. S. Department of Commerce Washington, DC 20203	
RIS	Redwood Inspection Service 405 Enfrente Rd Novato, CA 94949	(415) 382-0662
RCSHSB	Red Cedar Shingle and Handsplit Shake Bureau	Refer to CSSB
RFCI	Resilient Floor Covering Institute 966 Hungerford Dr., Suite 12B Rockville, MD 20850 www.buildernet.com/rfici	(301) 340-8580
SDI	Steel Deck Institute P.O. Box 25 Fox River Grove, IL 60021-0025 www.sdi.org	(847) 462-1930

SDI	Steel Door Institute 30200 Detroit Rd. Cleveland, OH 44145 www.steeldoor.org	(440) 899-0010
SIGMA	Sealed Insulating Glass Manufacturers Association 401 N. Michigan Ave Chicago, IL 60611 www.sigmaonline.org	(312) 664-6610
SJI	Steel Joist Institute 3127 10 th Ave Extension North Myrtle Beach, SC 29582 www.steeljoist.org	(843) 626-1995
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association 4201 Lafayette Center Drive Chantilly, VA 20151 www.smacna.org	(703) 803-2980
SSPC	The Society for Protective Coatings (Formerly: Steel Structures Painting Council) 4516 Henry St., 6 th Flr Pittsburgh, PA 15222 www.sspc.org	(412) 281-2331
TCA	Tile Council of America, Inc. 100 Clemson Research Blvd Anderson, SC 29625 www.tileusa.com	(864) 646-8453
UL	Underwriters' Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062 www.ul.com	(800) 704-4050
USGBC	US Green Building Council 1825 I St. NW, Suite 400 Washington, DC 20006 www.usgbc.org	(202) 429-2081
WCLIB	West Coast Lumber Inspection Bureau Box 23145 Portland, OR 97281 www.wclib.org	(503) 639-0651
WDMA	Window and Door Manufacturing Association (Formerly: National Woodwork Manufacturers Association) 1400 E. Touhy Avenue, Ste 470 Des Plaines, IL 60018 www.wdma.com	(800) 223-2301
WWPA	Western Wood Products Association 522 S.W. 5th Ave., Ste 500 Portland, OR 97204 www.wwpa.org	(503) 224-3930

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SECTION 01 42 15

TERMINOLOGY

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Terminology used on drawings and within specifications and the meanings intended. The following list is limited to those words which experience indicates are most often misused and sources of confusion. Words, which are consistently properly used and understood, are not included.

1.2 DEFINITIONS PERTAINING TO THE CONTRACT DOCUMENTS

- A. In accordance with Section 01 11 00 - Summary of Work.

1.3 TERMS ("GREEN" BUILDING AND LEED™ RELATED)

- A. **ADEQUATE VENTILATION:** Ventilation, including air circulation and air changes. Required to cure materials, dissipate humidity, and prevent accumulation of dust fumes, vapors, or gases. [See Section 01 81 13 - for requirements relating to Indoor Environmental Quality (EQ) Prerequisite No. 1 - Minimum IAQ Performance.] (Section 01 35 43)
- B. **AIR BARRIER SYSTEM:** The assembly of components used in building construction to create a plane of air tightness throughout the building envelope and to control air leakage. (Icynene)
- C. **ADAPTIVE REUSE:** Renovation of a building or site to include elements that allow a particular use or uses to occupy a space that originally was intended for a different use. (Antron)
- D. **ALTERNATIVE ENERGY:** Energy from a source other than the conventional fossil-fuel sources of oil, natural gas and coal (i.e., wind, running water, the sun). Also referred to as "alternative fuel." (Antron)
- E. **BAKE-OUT:** Process by which a building is heated in an attempt to accelerate VOC emissions from furniture and materials. (Antron)
- F. **BIODEGRADABLE:** Waste material composed primarily of constituent parts that occur naturally, are able to be decomposed by bacteria or fungi, and are absorbed into the ecosystem. Wood, for example, is biodegradable, while plastics are not. (Antron)
- G. **BUILDING ENVELOPE:** The external elements walls, floor, ceiling, roof, windows and doors of a building that encloses conditioned space; the building shell. (Icynene)
- H. **BUILDING FOOTPRINT:** The area on a project site that is used by the building structure and is defined by perimeter of the building plan. Parking lots, landscape and other non-building facilities are not included in the building footprint. (LEED SS Credit5)
- I. **BROWNFIELDS:** Abandoned, idled or underused industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination. (Antron)
- J. **CHAIN OF CUSTODY:** A tracking procedure to document the status of a product from the point of harvest or extraction to the ultimate consumer end use. (from LEED™ Reference Guide Version 2.0, June 2001, pg 188)

- K. CHEMICAL WASTE: Includes petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes. (Section 01 35 43)
- L. CLOSED-LOOP RECYCLING: When a used product is recycled into a similar product; a recycling system in which a particular mass of material (possibly after upgrading) is remanufactured into the same product (e.g., glass bottles into glass bottles). (Antron)
- M. COMPOST: Process whereby organic wastes, including food wastes, paper and yard wastes, decompose naturally, resulting in a product rich in minerals and ideal for gardening and farming as a soil conditioner, mulch, resurfacing material or landfill cover. (Antron)
- N. CONSTRUCTION [AND DEMOLITION] WASTE: Includes solid wastes, such as building materials, packaging, rubbish, debris, and rubble resulting from construction, remodeling, repair, [and demolition]operations.
1. Rubbish: Includes both combustible and noncombustible wastes, such as paper, boxes, glass, crockery, metal and lumber scrap, metal cans, and bones.
 2. Debris: Includes both combustible and noncombustible wastes, such as leaves and tree trimmings that result from construction or maintenance and repair work. (Section 01 35 43)
- O. CRADLE-TO-CRADLE: A term used in life-cycle analysis to describe a material or product that is recycled into a new product at the end of its defined life. (Antron)
- P. CRADLE-TO-GRAVE: A term used in life-cycle analysis to describe the entire life of a material or product up to the point of disposal. Also refers to a system that handles a product from creation through disposal. (Antron)
- Q. DAYLIGHTING: Daylighting optimizes the use of natural light through design considerations to illuminate the interior of buildings during the day. Common daylighting strategies include the proper orientation and placement of windows, use of light wells, light shafts or tubes, skylights, clerestory windows, light shelves, reflective surfaces, and shading, and use of interior glazing to allow light into adjacent spaces. (Dcat)
- R. DEVELOPMENT FOOTPRINT: The area on the project site that has been impacted by any development activity. Hardscape, access roads, parking lots, non-building facilities and building structure are all included in the development footprint.
- S. ENVIRONMENTAL FOOTPRINT: For an industrial setting, this is a company's environmental impact determined by the amount of depletable raw materials and nonrenewable resources it consumes to make its products, and the quantity of wastes and emissions that are generated in the process. Traditionally, for a company to grow, the footprint had to get larger. Today, finding ways to reduce the environmental footprint is a priority for leading companies. (Antron)
- T. ENVIRONMENTALLY RESPONSIBLE MATERIALS:
1. Products made from environmentally attractive materials such as "salvaged products" and "products with post-consumer recycled content."
 2. Products that are green because of what isn't there, such as alternative to products made from PVC and polycarbonate.
 3. Products that reduce environmental impacts during construction, renovation, or demolition.
 4. Products that reduce environmental impacts of the building operation, such as equipment that conserves energy and products that prevent pollution or reduce waste.
 5. Products that contribute to a safe, healthy indoor environment such as products that remove indoor pollutants. (Section 01 35 43)

- U. ENVIRONMENTAL TOBACCO SMOKE: Secondhand tobacco smoke exposure. (Antron)
- V. FLY ASH
 1. A fine, glass-powder recovered from the gases of burning coal during the production of electricity. These micron- sized earth elements consist primarily of silica, alumina and iron. When mixed with lime and water the fly ash forms a cementitious compound with properties very similar to that of Portland cement. Because of this similarity, fly ash can be used to replace a portion of cement in the concrete, providing some distinct quality advantages. The concrete is denser resulting in a tighter, smoother surface with less bleeding. Fly Ash concrete offers a distinct architectural benefit with improved textural consistency and sharper detail.
 2. Fly ash with a low LOI (carbon content) is used as a substitute for Portland cement in concrete. Regulations vary from state to state, however, ASTM suggests that fly ash must not contain more than 6% unburned carbon to be used for its cementitious qualities. Otherwise, concrete companies use it as a fine aggregate in concrete block. Others use it for filling old coal mines, seaside docking areas and as a lining for hazardous waste dumps. (Antron)
- W. GREEN BUILDING: Green Building refers to the process of designing and constructing buildings in ways that minimize their negative ecological impacts. This includes concern for the full life cycle impacts of buildings from the acquisition of resources and materials, transportation, processing, manufacture, distribution, installation, use, maintenance, repair, and ultimate disposal. Green building usually also includes efforts to ensure energy efficiency, material and resource efficiency and healthy and safe indoor environment in terms of the toxicity of materials and indoor air quality. (Dcat)
- X. GREEN DEVELOPMENT: Green development is a development approach that benefits or has minimal negative impacts to the local and larger environment, uses resources efficiently (including community resources), and is sensitive to the existing local culture and community. (Dcat)
- Y. GREEN MATERIALS, PRODUCTS, AND SYSTEMS: Green materials, Products, and systems have many of the following characteristics: are durable, are low-maintenance, have low-embodied energy (energy required to acquire, transport, manufacture and install), are locally available, are made from recycled or renewable resources and can be recycled or renewed, have low toxicity, produce little pollution or waste, and have minimal negative ecological impacts. (Dcat)
- Z. GREENFIELD: Undeveloped land or land that has not been impacted by human activity.
- AA. GREENWASH: Disinformation disseminated by an organization so as to present an environmentally responsible public image. (Antron)
- AB. INDOOR AIR QUALITY (IAQ): ASHRAE defines acceptable indoor air quality as air in which there are no known contaminants at harmful concentrations as determined by cognizant authorities and with which 80% or more people exposed do not express dissatisfaction. (Antron)
- AC. INTEGRATED WASTE MANAGEMENT: The complementary use of a variety of practices to handle solid waste safely and effectively. Techniques include source reduction, recycling, composting, combustion and landfilling. (Antron)
- AD. LIFE CYCLE OF A PRODUCT: All stages of a product's development, from extraction of fuel for power to production, marketing, use and disposal. (Antron)
- AE. LIFE CYCLE ANALYSIS (LCA): The assessment of a product's full environmental costs, from raw material to final disposal, in terms of consumption of resources, energy and waste. (Antron)

- AF. MATERIAL SAFETY DATA SHEET (MSDS): A standard formatted information sheet, prepared by a material manufacturer, describing the potential hazards, physical properties, and procedures for safe use of a material. (Icynene)
- AG. OPEN-LOOP RECYCLING: A recycling system in which a product made from one type of material is recycled into a different type of product (e.g., used newspapers into toilet paper). The product receiving recycled material itself may or may not be recycled. (Antron)
- AH. PASSIVE SOLAR DESIGN: Passive solar design of buildings maximizes the use of the sun for heating during cool weather and minimizes solar gain from the sun in warm weather. Design features typically include south-facing orientation of windows for winter sun (in the northern hemisphere), general east-west orientation of the building, roof and overhangs that provide shade from the summer sun but allow the winter sun through the windows, and thermal mass in the interior to store heat or coolness and maintain more constant temperatures within the structure. Good insulation is typical also for most of the building envelope, to control heat loss and gain. (Dcat)
- AI. POST-CONSUMER MATERIAL: Any household or commercial product that has served its original, intended use. (Antron)
- AJ. POST-CONSUMER RECYCLE CONTENT: A product composition that contains some percentage of material that has been reclaimed from the same or another end use at the end of its former, useful life. (Antron)
- AK. POST-INDUSTRIAL MATERIAL: Industrial manufacturing scrap or waste; also called pre-consumer material. (Antron)
- AL. POST-INDUSTRIAL RECYCLE CONTENT: A product composition that contains some percentage of manufacturing waste material that has been reclaimed from a process generating the same or a similar product. Also called pre-consumer recycle content. (Antron)
- AM. RECLAMATION: Restoration of materials found in the waste stream to a beneficial use that may be other than the original use. (Antron)
- AN. RECYCLE: A strategy to process material in order to extend the usable life of that material. (Section 01 35 43)
- AO. REDUCE: A strategy to use less of a material or to use it more efficiently. (Section 01 35 43)
- AP. RENEWABLE RESOURCES: A resource that can be replenished at a rate equal to or greater than its rate of depletion; i.e., solar, wind, geothermal and biomass resources. (Antron)
- AQ. RESOURCE CONSERVATION: Practices that protect, preserve or renew natural resources in a manner that will ensure their highest economic or social benefits. (Antron)
- AR. RETROFIT: The modification of an existing building or facility to include new systems or components. (Icynene)
- AS. REUSE:
1. A strategy to return a material to achieve use in the same or a related capacity. ((Section 01 35 43)
 2. Using a product or component of municipal solid waste in its original form more than once. (Antron)

AT. SALVAGED MATERIALS: Construction materials recovered from existing building and reprocessed for reuse in other buildings. Common salvaged materials include structural beams and posts, flooring, doors, cabinetry, brick and decorative items. (from LEED™ Reference Guide Version 2.0, June 2001, pg188)

AU. Sediment: Soil and other debris that has been eroded and transported by storm or well production runoff water. (Section 01 3543)

AV. SOLAR THERMAL WATER HEATING: Here the energy of the sun is used to provide or supplement a building's hot water supply. This can be both domestic hot water and for building heat, usually through radiant heat systems. (Dcat)

AW. SOURCE REDUCTION.

1. The design, manufacture, purchase or use of materials to reduce the amount or toxicity of waste in an effort to reduce pollution and conserve resources (i.e., reusing items, minimizing the use of products containing hazardous compounds, extending the useful life of a product and reducing unneeded packaging).
2. Practices that reduce the amount of any hazardous substance, pollutant or contaminant entering any waste stream or otherwise being released into the environment. Such practices also reduce the risk to public health and the environment associated with such releases. Term includes equipment or technology modifications, substitution of raw materials, and improvements in housekeeping, maintenance, training or inventory control. (Antron)

AX. TIPPING FEE:

1. Charge for the unloading or dumping of waste at a recycling facility, composting facility, landfill, transfer station or waste-to-energy facility. (Antron)
2. Fees charged by the landfill for dumping large volumes of disposable waste. The fee is usually quoted for one ton of waste. (Section 01 3543)

AU. TOTAL VOLATILE ORGANIC COMPOUNDS: The total mass, typically in milligrams per cubic meter, of the organic compounds collected in air. (Antron)

AZ. VAPOR RETARDER: A layer of moisture resistant material usually which controls moisture diffusion (defined as less than 1 perm) to prevent moisture build up in the walls. (Icynene)

BA. VOLATILE ORGANIC COMPOUNDS (VOC): Any compound containing carbon and hydrogen or containing carbon and hydrogen in combination with other elements. (Icynene)

BB. WASTE TO ENERGY: Burning of industrial waste to provide steam, heat or electricity. Sometimes referred to as waste-to-fuel process. (Antron)

1.4 TERMS (ELECTICITY, HVAC AND VENTILATION RELATED)

A. AIR CHANGES PER HOUR (ACH): An expression of ventilation rates - the number of times in an hour that a home's entire air volume is exchanged with outside air. (Icynene)

B. BATTERY POWER STORAGE SYSTEMS: Battery systems that are designed to store power in batteries that has been generated by solar photovoltaic, wind, micro-hydroelectric, or other site-based power generation systems. (Dcat)

C. BLOWER DOOR: Diagnostic equipment consisting of a fan, removable panel and gauges, used to measure and locate air leaks. (Icynene)

- D. **COMBUSTION EFFICIENCY:** A measure of useful heat extracted from a fuel source by an operating heating appliance. For example a furnace with a combustion efficiency of 60 percent converts 60 percent of the fuels energy content into useful heat. The rest is lost as exhaust gases. (Icynene)
- E. **CONDUCTION TRANSMISSION:** of energy (heat /sound) through a material or from one material to another by direct contact. Materials with low rates of conductive heat transfer make good insulation. (Icynene)
- F. **CONVECTION TRANSMISSION:** of energy (heat /sound) from one place to another by movement of a fluid such as air or water. (Icynene)
- G. **DEW POINT:** The temperature at which a vapor begins to condense. (Icynene)
- H. **EXFILTRATION:** Uncontrolled leakage of conditioned air from inside the home to the outside. (Icynene)
- I. **HEAT RECOVERY VENTILATION SYSTEM:** A mechanical ventilation system that recovers energy from exhausted indoor air and transfers it to incoming air. This system usually incorporates an air-to-air heat exchanger which transfers the heat from exhaust air to the incoming air or vice versa. (Icynene)
- J. **HUMIDISTAT:** A humidity sensitive control device that signals the ventilation system to operate if the humidity goes above a preset limit. (Icynene)
- K. **MICRO-HYDROELECTRIC SYSTEMS:** Micro hydroelectric systems generate electricity by harnessing the flow of a stream or some other small scale flowing water source. Surplus electricity is often stored in a battery storage system for later use. (Dcat)
- L. **PASSIVE VENTILATION:** Passive ventilation relies typically on using both convective air flows that result from the tendency of warm air to rise and cool air to sink and taking advantage of prevailing winds. Many passive ventilation systems rely on the building users to control window and vents as dictated by site conditions and conditions within the building. (Dcat)
- M. **RELATIVE HUMIDITY:** The ratio expressed as a percentage of the amount of moisture air actually contains to the maximum amount it could contain at that temperature. (Icynene)
- N. **SOLAR PHOTOVOLTAIC SYSTEMS:** These systems harness the energy of the sun and convert it into electricity. This electricity can be used as either direct current (DC) power or alternating current (AC) power if an inverter is used. Surplus electricity is often stored in a battery storage system for later use. (Dcat)
- O. **SOLAR THERMAL AIR HEATING:** This uses the energy of the sun to heat air either for direct space heating or to heat the thermal mass of the building or heat storage systems (such as water tanks, rock pits). (Dcat)
- P. **THERMAL BRIDGE:** A thermally conductive material which penetrates or bypasses an insulation system; such as a metal fastener or stud. (Icynene)
- Q. **THERMAL RESISTANCE: (R)** An index of a material's resistance to heat flow. (Icynene)
- R. **WIND POWER SYSTEMS:** These convert the energy of the wind into electricity. Surplus electricity is often stored in a battery storage system for later use. (Dcat)

1.5 TERMS (WATER RELATED)

- A. **GREYWATER SYSTEMS:** Greywater systems take water used once for washing clothes or bodies and distribute that water for secondary use, typically for substrate irrigation of landscaping. (Dcat)
- B. **WATER HARVESTING SYSTEMS:** These systems collect rainwater for use after a rain event. Features in the system include catchment/storage systems such as gutters and cisterns, landscaping features (swales, basins, etc.) to direct the rainwater to plants and/or hold the water to slow the infiltration rate. (Dcat)

1.6 TERMS (UNITS RELATED)

- A. **BTU:** British Thermal Unit - The amount of energy that is required to raise 1 lb. of water up 1° F (Icynene)
- B. **BTUH:** A rate of energy transfer - can be expressed as Btu's/hour. (Icynene)
- C. **KILOWATT-HOUR (kWh):** Standard unit for measuring electrical energy consumption- kilowatts X hours. (Icynene)
- D. **PERM:** A unit of water vapor transmission defined as 1 grain of water vapor per square foot per hour per inch of mercury pressure difference (1 inch mercury = 0.49 psi). Metric unit of measure is ng/m² s Pa. 1 perm = 55 ng/m² s Pa. (Icynene)
- E. **PH:** A measure of acidity/alkalinity of aqueous mixtures. A measure of pH 7 is neutral, lower is more acidic, higher is more alkaline. (Icynene)
- F. **PSI:** Pounds per square inch. (Icynene)
- G. **R A:** unit of measurement of resistance to heat flow in hr. ft² ° F/BTU.in. (Icynene)
- H. **RSI:** A unit of measurement of resistance to heat flow in m² ° C/W per 25 mm. R = 0.176 RSI. (Icynene)
- I. **U-VALUE:** Overall thermal conductance. U value is equal to the inverse of the sum of the R-values in a system (U = 1 /R total). (Icynene)

1.7 TERMS (GENERAL)

- A. **ACCESS DOOR:** Small doors not included in door schedules which are typically a prefabricated assembly including frame and door.
- B. **ACCESS PANEL** A section of finish which can be opened.
- C. **ACOUSTICAL SEALANT:** Non-hardening caulking or sponge tape used to seal partitions to structural ceiling, walls and floor to reduce sound transmissions.
- D. **ANCHOR BOLT:** A bolt that is embedded in masonry or cast-in-place in concrete.
- E. **AS-BUILT DRAWING:** A drawing or print marked by the Contractor to show actual conditions as constructed. For Architect's drawing, see RECORD DRAWING.
- F. **BACKING:** A continuous material behind entire area of finish, as opposed to intermittent or edge support.
- G. **BATT INSULATION:** Roll type insulation for installation between studs or joists, either pressed fit or stapled. See also BLANKET INSULATION.

- H. BLANKET INSULATION: Roll type insulation for installation over suspended ceiling or on plane wall surfaces. Either laid loose or secured with stick clips. See also BATT INSULATION.
- I. BUILDING PAPER: Sheathing paper or felt.
- J. CAULK, CAULKING: Non-elastomeric fillers and joints subject to little movement, generally indoors.
- K. CASING BEAD: Plaster stop.
- L. CEMENT PLASTER: Portland cement plasters used at interior spaces.
- M. COLD JOINT: Use to describe a joint where the material on one side of the joint is to be set or hard before the other side is installed and no particular bonding is expected.
- N. CONTROL JOINT: A joint to limit cracking, or a joint which is necessary to the construction process but continuity or bonding is required.
- O. DAMPPROOFING: A coating intended to resist vapor transmission and dampness, but not designed to resist a head of water.
- P. DELETE: Something to be taken out by intention. See also OMIT.
- Q. DOWNSPOUT: A rain water conduit made of sheet metal or plastic. See also LEADER.
- R. ELASTOMERIC: A material which is inherently rubbery, typically used to describe sealant, flashing, membrane, etc.
- S. EXPANSION BOLT: Single unit bolt with integral anchoring device, such as Wej-it or Kwik Bolt.
- T. EXPANSION JOINT: A joint designed for structural movement, both expansive and contractive.
- U. EXPANSION SHIELD: Use for devices that receive a separate screw or bolt and also note type of screw or bolt.
- V. FURRED CEILING: Any ceiling not directly attached to the floor or roof framing above except suspended acoustical ceiling.
- W. FURRING: Any ceiling not directly attached to the floor or roof framing above except suspended acoustical ceiling.
- X. FURRING CHANNEL: Cold rolled steel channel. For hat-shaped 25 gauge steel channels see METAL FURRING.
- Y. GLAZED OPENING: Used at interior partitions.
- Z. GROOVE: A long, narrow indentation. In wood, use only when parallel to the grain. See also RABBET.
- AA. GROUT: Any cementitious material used to fill, level or set other materials.
- AB. GYPSUM BOARD: Wall and ceiling finish material. Abbreviation is GYP.BD.
- AC. HANDRAIL: Single rail. For protective barricade type rails see RAILING.
- AD. HANGER: Any suspended structural member by which other members are attached.

- AE. HARDWOOD: No specific species. Wood from broadleaved evergreen or deciduous trees. See also WOOD for softwood.
- AF. HEAVYGAUGE FRAMING: Weldable load bearing metal studs and joists.
- AG. HOISTWAY: Use for elevators and dumbwaiters.
- AH. HOISTWAY BEAM: Beams supporting guiderails between multiple hoistways.
- AI. JOINT BACKER: Material behind sealant which establishes depth of sealant. Generally shown on drawings but not noted.
- AJ. JOINT FILLER: Material which fills entire joint. May also be used with sealant.
- AK. LEADER: A rain water conduit made of pipe or tubing. See also DOWNSPOUT.
- AL. LIGHTGAUGE FRAMING: 20 and 25 gauge non-loadbearing interior framing assemblies. For weldable loadbearing assemblies see HEAVYGAUGE FRAMING.
- AM. LIGHTWEIGHT AGGREGATE CONCRETE: Concrete of lightweight aggregates not designed to provide insulation.
- AN. METAL FRAME: Pressed metal frames used with doors and panel or glazed openings.
- AO. METAL FURRING: Hat-shaped, 25 gauge steel channels used to furr out walls and for furring ceilings. For cold rolled steel channels see FURRING CHANNEL.
- AP. OMIT: To leave out by intention. See also DELETE.
- AQ. PANELING: Sheet or board material for interior use.
- AR. PANELS: Sheet material, with some sort of joint or trim for exterior or interior use.
- AS. PARTITION: Non-loadbearing vertical panel subdividing interior spaces, either rated or non-rated. For loadbearing see WALL.
- AT. PATCH: Replacement or repair of material or finish to match existing conditions.
- AU. PLASTER: Specifications shall define type, i.e., gypsum plaster, Keenes Cement, etc.
- AV. PROVIDE: Denotes "Furnish and Install."
- AW. RABBET: Groove at edge of member only.
- AX. RAILING: Multiple railed barrier. See also HANDRAILS.
- AY. RECORD DRAWING: Drawings revised to include construction changes. See "AS-BUILT DRAWING" for drawings prepared by the Contractor.
- AZ. REFINISH: To put a finish back into its original condition.
- BA. RELOCATE: To move from one location and install in another location.
- BB. REPLACE: To provide a substitute or equivalent for.
- BC. RUNNER CHANNEL: 1-1/2 inch cold rolled steel channel.
- BD. SCREED: Metal or wood strip placed at intervals to gauge thickness of applied materials.

- BE. SCRIBE STRIP: Strip to make tight closure to adjoining surfaces.
- BF. SEALANT: Elastomeric materials at joints subject to movement or weather penetration at outdoors or indoors. If purpose is acoustical use ACOUSTICAL SEALER.
- BG. SEAMLESS FLOORING: Sheet material with joints field welded or sealed, or field installed materials finished to provide a homogenous flooring material.
- BH. SECTION:
 1. Drawing showing cut through an object.
 2. Subdivision of a Division of the specifications as defined by the CSI Master Format.
- BI. SELF-EDGE: Application to edge of plywood or particleboard of plastic laminate of same pattern as face surface.
- BJ. SERVICE SINK: Wall or floor mounted sink.
- BK. SHEET: Thin construction material.
- BL. SHEET FLOORING: Resilient flooring installed in lengths, generally wall to wall with joints depending upon manufactured widths of roll material.
- BM. SHEET METAL: General term on drawings with specifications defining particulars.
- BN. SOUND DEADENING BOARD: High density wallboard, wood fiber or gypsum, not suitable for painting or finishing.
- BO. STAGGER: To offset building elements in a horizontal or vertical plane as stagger studs, stagger joints.
- BP. STOCK: Raw material, i.e. 2x4 stock.
- BQ. STUD: Upright framing member of wood or metal.
- BR. SUBFLOORING: Usually of different grade and thickness than used for wall or roof sheathing.
- BS. THRU: Short version of THROUGH on drawings only.
- BT. TOE BOARD: Raised protective edge at balconies, landings, etc. (OSHA requirement).
- BU. TOE SPACE: Recess at base of cabinets.
- BV. TYPICAL: Representative example, characteristic of a kind.
- BW. UNDERLAYMENT: A smooth, hard sheet material, placed over rougher substrates to achieve a surface suitable for the application of such finishes as resilient tile.
- BX. WAINSCOT: Finish on the lower part of a partition when it differs from that of the upper wall.
- BY. WALL: Vertical panel enclosing a building or that serves as an occupancy separation. Generally loadbearing.
- BZ. WATERPROOFING: Designed to resist a head of water.
- CA. WOOD: Used to describe solid stock softwoods. See also HARDWOOD.

END OF SECTION

SECTION 01 45 00

QUALITY CONTROL

PART 1 GENERAL

1.1 TESTING LABORATORY SERVICES

- A. General Contractor shall coordinate with an independent testing laboratory, acceptable to the Resident Engineer, to perform their Work called for in the Contract Documents.
- B. Contractor shall furnish samples for such tests to the testing agency as directed by the Testing Agency. Owner shall pay for testing agency initial testing.
- C. Special Inspectors: Provide evidence of qualifications prior to beginning of inspections.
- D. The testing laboratory shall distribute copies of reports as follows:
 - 1. 1 copy to Owner
 - 2. 2 copies to the Architect
 - 3. 1 copy to the Structural Engineer
 - 4. 2 copies to the Contractor
 - 5. 1 copy to Governing Building Department (if applicable)
- E. Non-conformance items are to be identified by Testing Agency separately from daily observation reports within 48 hours.
- F. Costs for retesting required due to Contractor's failure to comply with specified requirements shall be paid for by the Contractor. Cost from "stand by" time by testing agency due to inadequate coordination by contractors shall be paid for by General Contractor.
- G. The following list is intended as a guide to the Contractor to aid in the determining testing requirements for the project, however, the requirements specified in the technical sections shall take precedence over this list and this list is not to be interpreted as being complete.
 - 1. 03 30 00 - Cast-In-Place Concrete: Test cylinders, slump test(s), floor flatness, calcium chloride moisture testing.
 - 2. 04 05 15 - Mortar and Masonry Grout: Test of mortar and grout mix, all masonry.
 - 3. 04 22 00 - Concrete Masonry Units: Prism testing.
 - 4. 05 10 00 - Structural Metal Framing: Welded connection tests, inspection of high strength bolts.
 - 5. 05 31 00 - Steel Deck: Deck testing/inspection when required.
 - 6. 05 41 00 - Load-Bearing Metal Stud System: Steel framing properties, when required.
 - 7. 07 92 00 - Joint Sealers: Field adhesion testing and stain testing.
 - 8. 31200 - Earthwork for Structures and Pavements: Test imported fill materials if required, observation of earthwork by Geotechnical Engineer, density and moisture testing of trench backfill, field density tests of underslab fill and backfill.
 - 9. Other testing as noted elsewhere in specifications.
- H. Contactor shall request testing with 72 hour prior written notice unless more stringent longer notification period is desired on drawings.

1.3 CONTRACTOR'S QUALITY CONTROL

- A. Where Specifications require that a particular product be installed and/or applied by an Applicator approved by the Manufacturer, it is the Contractor's responsibility to ensure that Subcontractor employed for such Work is approved. Such Subcontractor(s) shall provide evidence of being approved when requested by the Architect.
- B. Work shall be executed by mechanics skilled in the Work required. Conform to the methods, standards and accepted practices of the Trade or Trades involved.

1.4 SPECIAL INSPECTIONS

- A. Costs for Special Inspection fees will be paid directly by the Owner.
- B. Costs for scheduled or called for inspections of items that are not ready for inspection (under any and all circumstances) shall be back-charged to the Contractor.

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 GENERAL

- A. Comply with codes and regulations regarding potable drinking water, sanitation, dust control, fire protection, and other temporary controls.
- B. Remove temporary office facilities, toilets, storage sheds and other construction of temporary nature from the site as soon as, in the opinion of the Resident Engineer, the progress of the work will permit. Recondition and restore to a condition acceptable to the Resident Engineer, areas of the site occupied by temporary facilities.
- C. Obtain written approval from the Resident Engineer a minimum of 72 hours prior to disconnection or shutting off service or utility.

1.2 TEMPORARY ELECTRICITY

- A. Connect to existing power service. Power consumption shall not disrupt Owner's need for continuous service.
- B. Provide temporary electric feeder from location as directed.
- C. Provide power outlets for construction operations, with branch wiring and distribution boxes. Provide flexible power cords as required.
- D. Provide main service disconnect and overcurrent protection at convenient location.
- E. Permanent convenience receptacles may be utilized during construction.
- F. Provide adequate distribution equipment, wiring, and outlets to provide branch circuits for power and lighting.

1.3 TEMPORARY LIGHTING

- A. Provide incandescent lighting for construction operations to achieve a minimum lighting level of 2 watts/sq. ft.
- B. Provide adequate floodlights, clusters and spot illumination to work areas after dark.
- C. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtailed, and lamps as required.
- D. Maintain lighting and provide routine repairs.

1.4 TEMPORARY HEATING AND VENTILATING

- A. Provide temporary heating and ventilating as required to maintain specified conditions for construction operations and pay cost of energy used. Exercise measures to conserve energy.

- B. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place.
 - 1. If air handlers are used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 must be used at each return air grills, as determined by ASHRAE 52.2. Verify with Mechanical Engineer prior to implementation.
 - 2. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.
- C. Maintain minimum ambient temperature of 50 degrees F. in areas where construction is in progress, unless indicated otherwise in specifications.
- D. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- E. Also see requirements for "Construction IAQ Management Plan" as specified in Section 01 35 46 – Indoor Air Quality Management.

1.5 TELEPHONE AND INTERNET SERVICE

- A. At time of project mobilization, provide telephone for field office. A pay phone is not acceptable. Maintain and pay for telephone service, including costs for long distance service and calls.
- B. Computer and Internet Access: Provide computer with secure internet access in field office.
 - 1. Provide DSL or Cable wireless modem access with 1.5 Mbps minimum.
 - 2. Computer and wireless modem shall be made available to Contractors, Resident Engineer, Architect, Engineer, Owner and Site Visitors for use throughout construction.

1.6 TEMPORARY WATER SERVICE

- A. Provide, maintain and pay for suitable quality water service required for continued operations.
- B. Extend branch piping throughout the site to provide outlets for hoses with threaded connections.

1.7 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Existing facilities shall not be used by construction personnel.

1.8 TEMPORARY FIRE PROTECTION

- A. Provide adequate number of fire extinguishers to protect the Work.
- B. Comply with fire insurance and governing regulations.
- C. Provide UL labeled ABC all-purpose fire extinguishers adequate in size and number.
- D. Provide temporary office and storage areas with fire extinguishers.

1.9 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Provide protection for plant life designated to remain. Replace damaged plantlife.
- D. Protect non-owned vehicular traffic, stored materials, site and structures from damage.

1.10 FENCING

- A. Construction: Commercial grade chain link fence.
- B. Provide 6'-0" high fence around construction site; equip with vehicular and pedestrian gates with locks.
- C. Locate gates for access to work areas, as required. Close and lock after working hours.

1.11 NOISE AND DUST CONTROL

- A. Exercise controls to keep noise and dust during construction to a minimum. Traffic or construction areas shall be sprinkled with water or chemicals as required and in accordance with applicable regulatory requirements.
- B. Prevent polluting the air with dust and particulate matter to meet LEED Sustainable Sites Prerequisite No. 1 in accordance with the Erosion and Sedimentation Control (ESC) plan as specified in Section 01 57 13.
- C. Notify the Owner prior to using noise generating equipment in sufficient time to permit removal of occupants affected by such disturbances. Screen noisy equipment with temporary enclosures to shield adjacent areas.

1.12 WATER CONTROL

- A. Grade site to drain. Maintain excavations free of water. Provide, operate and maintain pumping equipment.
- B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- C. Provide construction activity pollution prevention: as indicated on Civil Drawings to meet LEED Sustainable Sites Prerequisite No. 1 in accordance with the Erosion and Sedimentation Control (ESC) plan as specified in Section 01 57 13.

1.13 EXTERIOR ENCLOSURES

- A. Provide temporary weather-tight closure of exterior openings to accommodate acceptable working conditions and protection for products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification Sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.14 PROTECTION OF INSTALLED WORK

- A. Protect installed Work and provide special protection where specified in individual specification Sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to minimize damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Prohibit traffic from landscaped areas.

1.15 SECURITY

- A. Provide security and facilities to protect Work and existing facilities, and Owner's operations from unauthorized entry, vandalism or theft.
- B. Provide and pay for watchman service if necessary for adequate protection.

1.16 ACCESS ROADS

- A. Construct and maintain temporary roads accessing public thoroughfares to serve construction area.
- B. Extend and relocate as Work progress requires. Provide detours necessary for unimpeded traffic flow.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Provide means of removing mud from vehicle wheels before entering streets.
- E. Designated existing on-site roads may be used for construction traffic.

1.17 PARKING

- A. Provide temporary surface parking areas to accommodate construction personnel.
- B. Limit parking by construction personnel to area designated by Owner.

1.18 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

- D. Regularly remove waste materials, debris, and rubbish from site and dispose off-site. Do not allow to accumulate.
- E. Construction Waste Management (Sustainable Design Projects): In accordance with Section 01 74 19 – Construction Waste Management and Disposal.

1.20 PROJECT IDENTIFICATION

- A. Provide project sign in accordance with requirements of City of San Diego boilerplate or per Green Book.
- B. Erect on site at location established by Resident Engineer.
- C. No other signs are allowed without Resident Engineer 's permission except those required by law.

1.21 FIELD OFFICES AND SHEDS

- A. Office for Resident Engineer: In accordance with City of San Diego boilerplate and Green Book.
- B. Locate offices and sheds as approved by Resident Engineer.

END OF SECTION

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SECTION 01 57 13

TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.1 SUMMARY

- A. LEED™ Certification:
1. Contractor shall ensure that the work provided under this section will provide the construction activity pollution prevention required by the LEED "Sustainable Sites" Prerequisite. Achievement of this prerequisite requires the creation and implementation of an Erosion and Sedimentation Control (ESC) Plan for all construction activities associated with the project. The ESC Plan shall conform to the erosion and sedimentation requirements of the 2003 EPA Construction General Permit, OR local erosion and sedimentation control standards and codes, whichever is more stringent. The Plan shall describe measures implemented to accomplish the following objectives:
 - a. Prevent loss of soil during construction by storm water runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse.
 - b. Prevent sedimentation of storm sewer or receiving streams.
 - c. Prevent polluting the air with dust and particulate matter.
 2. The Construction General Permit (CGP) outlines the provisions necessary to comply with Phase I and Phase II of the National Pollutant Discharge Elimination System (NP-DES) program. While the CGP only applies to construction sites greater than 1 acre, the requirements are applied to all project for the purposes of this prerequisite. Information on the EPA CGP is available at: <http://cfpub.epa.gov/npdes/stormwater/cgp.cfm>.
- B. The Contractor shall ensure that the work provided under this section will comply with CAL GREEN 5.106.1 and Section 31 00 00 – Temporary Erosion and Sedimentation Control in these Technical Specifications.
- C. The construction drawings include an Erosion Control Plan and Erosion Control details to assist the Contractor in preparation of the required documents for required submittals. The Contractor shall review these drawings to determine modifications are needed to comply with the Storm Water Discharge Permit requirements as they pertain to Contractor's construction operations. If modifications are required, the Contractor shall submit a redlined copy of the drawings to the Project Engineer for corrections. The Project Engineer will then make said corrections and return the drawings to the Contractor for submittal within five (5) working days following receipt of changes.
- D. The Contractor shall comply with all requirements and conditions of the General Permit and the Water Pollution Control Plan. Failure to do so will result in the issuing of an order to suspend work in addition to the potential fines that may be assessed.
- E. The Contractor responsibilities regarding maintenance of erosion control structures, after final project acceptance, will be limited to the areas disturbed by the utility and street construction for this project only. The Contractor will not be responsible for erosion control beyond the disturbed areas of this project due to adjacent construction. It is the Contractor's responsibility to document the extent of disruption due to construction activities directly related to this project. The documentation should include pictures with date stamp that is concurrent with the date of final acceptance.

1.2 SUBMITTALS - LEED

- A. Submit documentation to LEED Consultant regarding erosion and sedimentation control procedures followed, including; but not limited to; memos, letters, drawings, sketches and photographs.
- B. Provide monthly photographs showing the erosion and sedimentation control measures highlighted in the Erosion and Sedimentation Control Plan.

1.3 QUALITY ASSURANCE

- A. It is the permittee's responsibility to perform inspections of all storm water pollution control devices on the project on a monthly basis, and within 24 hours following each rainfall of 0.50 inch or more. The Contractor is responsible for maintaining those devices in proper working order, including cleaning and/or repair. No separate payment will be made for such inspections, cleaning, or repair.

PART 2 PRODUCTS

2.1 MATERIALS

- A. In accordance with Section 31 00 00 – Temporary Erosion and Sedimentation Control in these Technical Specifications and the applicable material requirements of the Civil Drawings.

PART 3 EXECUTION

- A. In accordance with Section 31 00 00 – Temporary Erosion and Sedimentation Control in these Technical Specifications and the applicable details of the Civil Drawings.

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 DELIVERY, STORAGE AND HANDLING

- A. Deliver manufactured materials in the original packages, containers or bundles, with the seals unbroken, identified by the name and mark of the Manufacturer.
- B. Deliver fabrications in as large assemblies as practicable. Fabrications specified to be shop-primed or shop-finished shall be packaged or crated as required to preserve such priming or finish intact and free from abrasion.
- C. Store materials in a manner to properly protect from damage. Materials or equipment damaged by handling, weather, dirt or other cause will not be acceptable.
- D. Store materials so as to cause no obstructions. Store off sidewalks, roadways, and underground services. The Contractor shall be responsible for protecting materials and equipment furnished under the Contract.
- E. When a room in the Project is used as a shop or store room, the Contractor shall be responsible for all repairs, patching or cleaning necessary due to such use. Location of such storage space shall be subject to approval of the Resident Engineer.
- F. Packaging shall be minimized whenever possible but shall not be reduced so as to cause damage to materials or products. Packaging shall be recycled in accordance with the requirements of Section 01 74 19 - Construction Waste Management.

1.2 SUBSTITUTIONS AND PRODUCT OPTIONS

- A. For products specified only by reference standard, select product meeting that standard, by any manufacturer.
- B. For products specified by naming three or more products or manufacturers, it is intended that the specified products of those manufacturers shall be furnished.
- C. For products specified by naming one or more products or manufacturers and stating "or other approved," or "or approved equal," or other such wording on Drawings or within Specifications Sections, it is intended that the products by "Acceptable Manufacturer's," which in the opinion of the Resident Engineer are equivalent to the specified product, specified by product number, may be furnished.
- D. Whenever a product is specified by using a proprietary name or the name of a particular Manufacturer or Vendor, the specific item mentioned shall be understood as establishing type, function, dimension, appearance, and quality desired.
- E. Other manufacturers' products will be accepted provided sufficient information is submitted to allow the Resident Engineer to determine that products proposed are equivalent to those named.

- F. Prior Approvals:
1. Products, equipment and systems that have relative importance to the project (as determined by the Architect) or that are not easily substituted after award of contract may be submitted for prior approval.
 2. Submittals of proposed substitution under "prior approved equal" shall be made only by the General Contractor (Prime Bidder). The Resident Engineer will not entertain direct submittals by manufacturers, suppliers or subcontractors.
 3. The Resident Engineer will consider written requests by a Prime Bidder only, for substitution(s) that is/are considered equivalent to the item(s) specified.
 4. The written request will be considered only if it is received at least 12 consecutive calendar days prior to the current established bid due date.
 5. The prime bidder shall furnish at his own expense and on their own letterhead the necessary data per substitution request form to substantiate and validate that the physical, chemical, and operational qualities of each substitute item is such that this item will fulfill its required function.
 6. The substitution, if approved, will be authorized by a written addendum under "prior approved items" to the contract documents and made available to all prime bidders.
- G. Requests for approval after award of a Contract:
1. Within 30 days after award of contract, formal requests will be considered by substitutions of products in place of those specified. After the end of that period, substitution requests will be considered only if the specified product is not available (or specified product or system has been deemed illegal or dangerous by governing agencies having jurisdiction over this project) and submission shall be in the hands of the Resident Engineer a minimum of 20 days prior to date Contractor is required to place an order for the product.
 2. Contractor shall request approval of such substitution, in writing, to the Resident Engineer using Document 00 63 25 - Substitution Request (After the Bidding Phase) form contained in the Technical Specifications.
 3. The request shall specifically state the reason that the product is unavailable with evidence to substantiate the reason.
 4. Provide documentation showing requested substitution provides sustainable design characteristics the specified product provided for achieving LEED prerequisites and credits.
 5. Requests made directly to Resident Engineer by suppliers, subcontractors and distributors that are not from the Contractor will not be accepted by the Resident Engineer.
 6. Resident Engineer will approve or reject substitution in writing, and in such form as the Resident Engineer directs.
 7. Substitutions will not be considered if they are indicated or implied on Shop Drawings or if acceptance will require substantial revision to the Contract Documents.
- H. Contractor shall submit descriptive brochures, drawings, samples and other data as is necessary to provide direct comparison to the specified materials after reviewing and determining that product meets specified requirements. Submittal shall include data for specified product in addition to data for substitution. Submittals shall be well marked and identified as to types and kind of the items being submitted for approval. Lack of sufficient information will be cause for rejection. Reference to catalogs will not be acceptable unless catalog is submitted with approval request.

- I. In submitting a substitution, the Contractor makes the following representations:
1. Proposed substitution has been fully investigated and determined to be equal or superior to specified product.
 2. Same warranty will be furnished for proposed substitution as for specified product.
 3. Same maintenance service and source of replacement parts, as applicable, is available.
 4. Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
 5. Proposed substitution shall provide sustainable design characteristics the specified product provided for achieving LEED prerequisites and credits.
 6. Cost data included on the substitution request is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
 6. Proposed substitution does not affect dimensions and functional clearances.
 7. Payment will be made for changes to building design, including A/E design, detailing, and construction costs by the substitution.
 8. Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.
- J. See also Section 01 35 43 - Environmental Procedures for substitution of green materials.

1.3 RECYCLED CONTENT

- A. LEED™ Certification: Contractor shall ensure that the work provided will include recycled content materials to achieve Materials & Resources Credit 4, option 1 and option 2.
1. Credit MRc4 option.1 requires use of materials with recycled content such that post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10% (based on cost) of the total value of the materials in the project.
 - a. The value of the recycled content portion of a material or furnishing shall be determined by dividing the weight of recycled content in the item by the total weight of all material in the item, then multiplying the resulting percentage by the total value of the item.
 - b. Mechanical, electrical and plumbing components, and specialty items such as elevators shall not be included in this calculation.
 2. Credit MRc4, option 2 (one point) requires that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes an additional 10% beyond MR Credit 4, option 1 (total of 20% based on cost) of the total value of the materials in the project.
- B. Submittals – LEED (for Recycled Content): Contractor shall download, complete and upload the Materials and Resource Calculator (found under “Credit Resource” on LEED-OnLine) to document sustainable criteria values for MR Credit 3-7. The following project data and calculation information is required to document credit compliance:
1. Provide the total project’s materials cost (Divisions 2-10) or provide the total cost (Divisions 2-10) to apply the 45% default materials value.
 2. Provide a tabulation of each material used on the project that is being tracked for recycled content. The tabulation must include a description of the material, the manufacturer of the material, the product cost, the pre-consumer and/or post-consumer percentage and the source of the recycled content.
 3. Provide an optional narrative describing any special circumstances or special conditions regarding the project’s credit approach.

- C. **Materials Containing Recycled Content:** Recycled content materials shall be defined in accordance with the International Organization for Standardization document, *ISO 14021 – Environmental labels and declarations – Self declared environmental claims (Type II environmental labeling)*.
1. Concrete and cementitious materials containing fly ash as specified in Section 03 05 05:
 - a. Section 03 30 00 - Cast-In Place Concrete.
 - b. Section 04 05 15 - Mortar and Masonry Grout.
 - c. Section 09 24 00 - Portland Cement Plaster (Stucco)
 2. Materials containing recycled steel:
 - a. Section 03 20 00 – Concrete Reinforcement
 - b. Section 05 10 00 – Structural Metal Framing.
 - c. Section 05 31 00 – Steel Deck.
 - d. Section 05 41 00 – Load-Bearing Metal Stud System
 - e. Section 05 50 00 – Metal Fabrications.
 - f. Section 05 51 00 – Steel Stairs
 - g. Section 05 52 00 – Handrails and Railings
 - h. Section 05 70 00 – Ornamental Metals
 - i. Section 07 60 00 – Flashing and Sheet Metal
 - j. Section 08 11 13 – Steel Doors and Frames
 - k. Section 09 22 16 – Non-Structural Metal Framing
 3. Other materials as specified throughout the Technical Specifications. (The following are examples)
 - a. Section 06 10 53 – Miscellaneous Carpentry
 - b. Section 06 20 00 – Finish Carpentry
 - c. Section 06 40 00 – Architectural Woodwork
 - d. Section 08 41 13 - Aluminum Entrances and Storefronts
 - e. Section 09 29 00 - Gypsum Board.
 - f. Section 09 30 00 - Tile
 - g. Section 09 51 00 – Acoustical Ceilings
 - h. Section 09 68 00 – Carpet Tile
 - i. Section 09 91 00 – Paint.
 4. Other materials as recommended by Contractor to achieve requirements specified in Section 01 81 13.
- D. Mechanical and electrical components shall not be included in the calculations for this Credit.

1.4 REGIONAL MATERIALS

- A. **LEED™ Certification:** Contractor shall ensure that the work provided will include regional Materials to achieve Materials & Resources Credit 5, options 1 and 2.
1. Credit MRc5, option 1 (one point) requires that 10% of building materials (based on cost) have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project.
 - a. Mechanical, electrical and plumbing components and specialty items such as elevators and equipment shall not be included in this calculation.
 - b. Only include materials permanently installed in the project.
 - c. Furniture may be included, providing it is included consistently in MR Credits 3-7.
 2. Credit MRc5, option 2 (one point) requires that an additional 10% of the building materials beyond MR Credit 5, option 1 (total of 20% based on cost) have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project.

- B. Submittals – LEED (for Regional Materials): Contractor shall download, complete and upload the Materials and Resource Calculator (found under "Credit Resource" on LEED-OnLine) to document sustainable criteria values for MR Credit 3-7. The following project data and calculation information is required to document credit compliance:
1. Provide the project's total cost (for application of 45% default factor) or total materials cost (note this reported value must be consistent across all MR credits.)
 2. Complete the regional materials calculation table in the submittal template.
 3. Provide an optional narrative describing any special circumstances or special conditions regarding the project's credit approach.
- C. Regional Materials:
1. Earthwork and site utilities as specified in Section 31200 – Earthwork for Structures and Pavements.
 2. Concrete and cementitious materials as specified in:
 - a. Section 03 30 00 - Cast-In Place Concrete.
 - b. Section 04 05 15 - Mortar and Masonry Grout.
 - c. Section 09 24 00 - Portland Cement Plaster (Stucco)
 3. Materials containing steel components that are locally fabricated:
 - a. Section 03 20 00 – Concrete Reinforcement
 - b. Section 05 10 00 – Structural Metal Framing.
 - c. Section 05 31 00 – Steel Deck.
 - d. Section 05 41 00 – Load-Bearing Metal Stud System
 - e. Section 05 50 00 – Metal Fabrications.
 - f. Section 05 51 00 – Steel Stairs
 - g. Section 05 52 00 – Handrails and Railings
 - h. Section 05 70 00 – Ornamental Metals
 - i. Section 07 60 00 – Flashing and Sheet Metal
 - j. Section 08 11 13 – Steel Doors and Frames
 - k. Section 09 22 16 – Non-Structural Metal Framing
 4. Other materials as specified throughout the Technical Specifications. (The following are examples)
 - a. Section 06 10 53 – Miscellaneous Carpentry
 - b. Section 06 20 00 – Finish Carpentry
 - c. Section 06 40 00 – Architectural Woodwork
 - d. Section 08 41 13 - Aluminum Entrances and Storefronts
 - e. Section 09 29 00 - Gypsum Board.
 - f. Section 09 30 00 - Tile
 - g. Section 09 51 00 – Acoustical Ceilings
 - h. Section 09 68 00 – Carpet Tile
 - i. Section 09 91 00 – Paint.
- D. Mechanical and electrical components shall not be included in the calculations for this Credit.

1.5 RAPIDLY RENEWABLE MATERIALS

- A. LEED™ Certification: Contractor shall attempt to include materials and products to achieve Materials & Resources Credit 6 which requires that rapidly renewable materials (made from plants that are typically harvested within a ten-year cycle or shorter) are used in the project for 2.5% of the total value of all building materials and products, based on cost.

- B. Submittals – LEED (for Rapidly Renewable Materials): Contractor shall download, complete and upload the Materials and Resource Calculator (found under “Credit Resource” on LEED-OnLine) to document sustainable criteria values for MR Credit 3-7. The following project data and calculation information is required to document credit compliance:
1. Provide the project’s total cost (for application of 2.5% default factor) or total materials cost (note this reported value must be consistent across all MR credits.)
 2. Complete the rapidly renewable materials calculation table in the Materials and Resource Calculator.
 3. Provide an optional narrative describing any special circumstances or special conditions regarding the project’s credit approach.
- C. Rapidly Renewable Materials:
1. Materials as specified throughout the Technical Specifications. (The following are examples):
 - a. Section 06 10 53 - Miscellaneous Carpentry
 - b. Section 06 20 00 - Finish Carpentry
 - c. Section 06 40 00 - Architectural Woodwork
 - d. Section 07 42 43.13 - Solid Composite Exterior Wall Panels
 2. Other materials as recommended by Contractor to achieve requirements specified in Section 01 81 13.

1.6 LOW-EMITTING MATERIALS

- A. LEED™ Certification: Contractor shall ensure that the work provided under this section will provide Low-Emitting Materials to achieve Indoor Environmental Quality Credit 4.1, 4.2, 4.3, and 4.4.
1. Credit EQc 4.1 requires that adhesives and sealants used on the interior of the building (defined as inside of the weatherproofing systems and applied on-site) shall comply with the requirements of the following reference standards:
 - a. Adhesives, Sealants and Sealant Primer: South Coast Air Quality Management District (SCAQMD) Rule #1168. Contractor shall comply with VOC limits as required by LEED OnLine to achieve this credit.
 - b. Aerosol Adhesives: Green Seal Standard for Commercial Adhesives GS-36 requirements in effect on October 19, 2000. Contractor shall comply with VOC limits as required by LEED OnLine to achieve this credit.
 - c. Materials that must comply with these requirements include, but are not limited to:
 - 1) Adhesives specified in various sections of the specifications.
 - 2) Sealants as specified in Section 07 92 00
 2. Credit EQc 4.2 requires that paints and coatings used on the interior of the building (defined as inside of the weatherproofing systems and applied on-site) shall comply with the requirements of the following criteria:
 - a. Architectural paints, coatings and primers applied to interior walls and ceilings: Do not exceed the VOC content limits established in Green Seal Standard GS-11, Paint, First Edition, May 20, 1993. Contractor shall comply with VOC limits as required by LEED OnLine to achieve this credit.
 - b. Anti-corrosive and anti-rust paints applied to interior ferrous metal substrate: Do not exceed the VOC content limit of 250 g/L established in Green Seal Standard GC-03, anti-Corrosive Paints, Second Edition, January 7, 1997. Contractor shall comply with VOC limits as required by LEED OnLine to achieve this credit.

- c. Clear wood finishes, floor coatings, stains, sealers and shellacs applied to interior elements: Do not exceed the VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coating, rules in effect on January 1, 2004. Contractor shall comply with VOC limits as required by LEED OnLine to achieve this credit.
 - d. Materials that must comply with these requirements include, but are not limited to:
 - 1) Primers for steel specified in Sections 05 10 00 and 05 50 00.
 - 2) Stains and sealers specified in Section 06 40 00
 - 3) Interior paints as specified in Section 09 91 00.
 - 4) Other clear wood finishes, floor coatings, sealers and stains specified elsewhere in the Technical Specifications.
3. Credit EQc 4.3 requires that:
- a. Carpet installed in the building interior shall meet the testing and product requirements of the Carpet and Rug Institute's Green Label Plus program.
 - b. Carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute Green Label program.
 - c. Carpet adhesive shall meet the requirements of EQ Credit 4.1. Contractor shall comply with VOC limits as required by LEED OnLine to achieve this credit.
 - d. All hard surface flooring must meet the requirements of the FloorScore standard (current as of the date of this rating system, or more stringent version) as shown with testing by an independent third-party. Mineral-based finish flooring products such as tile, masonry, terrazzo, and cut stone without integral organic-based coatings and sealants and unfinished/untreated solid wood flooring qualify for credit without any IAQ testing requirements. However, associated site-applied adhesives, grouts, finishes and sealers must be compliant for a mineral-based or unfinished/untreated solid wood flooring system to qualify for credit.
 - e. Concrete, wood, bamboo and cork floor finishes such as sealer, stain and finish must meet the requirements of South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on January 1, 2004.
 - f. Tile setting adhesives and grout must meet South Coast Air Quality Management District (SCAQMD) Rule 1168. VOC limits correspond to an effective date of July 1, 2005 and rule amendment date of January 7, 2005.
4. Credit EQc 4.4 requires that wood and agrifiber products used on the interior of the building (defined as inside of the weatherproofing systems and applied on-site) must contain no added urea-formaldehyde resins and that laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.
- a. Materials that must comply with these requirements include, but are not limited to:
 - 1) Composite wood products applied on-site inside the building weatherproofing systems such as sheathing, doors, and other structural and non-structural applications.
 - 2) Wood doors as specified in Section 08 14 00.

- B. Submittals – LEED (for Low Emitting Materials): Contractor shall submit a completed LEED-NC 2009 form and supporting documentation for LEED IEQc4.1, 4.2, 4.3 and 4.4 to the Architect to be included with the comprehensive "Construction Submittal." The following project data and calculation information is required to document credit compliance using version 2.2 credit templates:
1. LEED IEQc4.1
 - a. Provide a listing of each indoor adhesive, sealant and sealant primer product used on the project. Include the manufacturer's name, product name, specific VOC data (in g/L, less water) for each product, and the corresponding allowable VOC from the referenced standard.
 - b. Provide a listing of each indoor aerosol adhesive product used on the project. Include the manufacturer's name, product name, specific VOC data (in g/L, less water) for each product, and the corresponding allowable VOC from the referenced standard.
 - c. Provide a narrative to describe any special circumstances or non-standard compliance paths taken by the project.
 2. LEED IEQc4.2
 - a. Provide a listing of each indoor paint and coating used on the project. Include the manufacturer's name, product name, specific VOC data (in g/L) for each product, and the corresponding allowable VOC from the referenced standard.
 - b. Provide a narrative to describe any special circumstances or non-standard compliance paths taken by the project.
 3. LEED IEQc4.3
 - a. Provide a listing of each carpet product installed in the building interior. Confirm that the product complies with the CRI Green Label Plus testing program.
 - b. Provide a listing of each carpet cushion product installed in the building interior. Confirm that the product complies with the CRI Green Label Plus testing program.
 - c. Provide a narrative to describe any special circumstances or non-standard compliance paths taken by the project.
 4. LEED IEQc4.4
 - a. Provide a listing of each wood and agrifiber product installed in the building interior noting whether added urea-formaldehyde is included in the product.
 - b. Provide a narrative to describe any special circumstances or non-standard compliance paths taken by the project.
- C. The Contractor shall ensure that the materials provided under this section will comply with CAL GREEN 5.504.4.

END OF SECTION

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cutting, fitting and patching, including attendant excavation and backfill required to complete Work, and for:
1. Making several parts fit together properly.
 2. Uncovering portions of Work to provide for installation of ill-timed Work.
 3. Removing and replacing defective and non-conforming Work.
 4. Removing samples of installed Work required for testing, as directed by Resident Engineer.
 5. Providing routine penetrations of non-structural surfaces for installation of piping and electrical conduit.
 6. Attaching new materials to existing remodeling areas.

1.2 SUBMITTALS

- A. **In advance of executing any cutting or alterations**, submit written request to Resident Engineer requesting consent to proceed with cutting which affects:
1. Work of Owner or other trades.
 2. Structural value or integrity of any element of Project.
 3. Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
 4. Efficiency, operational life, maintenance or safety of operational elements.
 5. Visual qualities of sight-exposed elements.
- B. Include in request:
1. Identification of Project.
 2. Description of affected Work.
 3. Necessity for cutting, alteration or excavation.
 4. Effect of Work of Owner or other trades, or structural or weatherproof integrity of Project.
 5. Description of proposed Work:
 - a. Scope of cutting, patching, alteration, or excavation.
 - b. Trades which will execute Work.
 - c. Products proposed to be used.
 - d. Extent of refinishing to be done.
 6. Alternatives to cutting and patching.
 7. Cost proposal, when applicable.
 8. Written permission of trades whose Work will be affected.
- C. Submit written notice to Resident Engineer designating time Work will be uncovered to provide for observation.

1.3 PAYMENT FOR COSTS

- A. Cost caused by ill-timed or defective Work or Work not conforming to Contract Documents shall be paid by Contractor.

- B. Cost of Work done on written instructions of Resident Engineer, other than defective or nonconforming Work, will be paid by Owner on approval of written Change Order. Provide written cost proposals prior to proceeding with cutting and patching proposed by Resident Engineer.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Provide for replacement of Work removed. Comply with Contract Documents for type of Work standards and Specification requirements for each specific product involved.

PART 3 EXECUTION

3.1 INSPECTION

- A. Inspect existing conditions of Work, including elements subject to movement or damage during cutting and patching, and excavating and backfilling. After uncovering Work, inspect conditions affecting installation of new products and verify procedures with Resident Engineer.
- B. Report unsatisfactory or questionable conditions in writing to Resident Engineer. Do not proceed with Work until further instructions are received.

3.2 PREPARATION

- A. Provide shoring, bracing and supports as required to maintain structural integrity of Work.
- B. Provide devices and methods to protect other portions of Work from damage, including elements which may be exposed by cutting and patching Work. Maintain excavations free from water.

3.3 ERECTION, INSTALLATION AND APPLICATION

- A. Performance:
 - 1. Execute fitting and adjustment of products to provide finished installation to comply with and match specified tolerances and finishes.
 - 2. Execute cutting and demolition by methods which prevent damage to other Work to provide proper surfaces to receive installation of repairs and new Work.
 - 3. Execute excavating and backfilling by methods which prevent damage to other Work and settlement as specified in Section 31200.
- B. Employ original installer or fabricator to perform cutting and patching for:
 - 1. Weather-exposed surfaces and moisture-resistant elements such as roofing, sheet metal, sealants and waterproofing.
 - 2. Sight-exposed finished surfaces.
- C. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances and finishes as shown on Drawings and as specified.
- D. Fit Work airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces. Conform to fire code requirements for penetrations and maintain integrity of fire walls and ceilings.

- E. Restore Work which has been cut or removed. Install new products to provide completed Work in accordance with requirements of Contract Documents and as required to match surrounding areas and surfaces.

- F. Refinish entire surfaces as necessary to provide an even, matching finish as follows:
 - 1. Painted Walls or Ceilings: To nearest intersection with another finish or corner.
 - 2. Where Applied Finishes Occur (i.e wallcovering, tile, wood paneling): To nearest intersection of finish without damage to adjacent material. Where match of pattern, grain, texture, or similar finish cannot be made, refinish area to intersection with other finish or corner.
 - 3. Manufactured or Shop Fabricated Materials: Replace entire affected surface or material.

END OF SECTION

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SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.1 SUMMARY

- A. The Owner has established that this Project shall minimize the creation of construction and demolition waste on the job site.
 - 1. Factors that contribute to waste such as over packaging, improper storage, ordering error, poor planning, breakage, mishandling, and contamination, shall be minimized.
 - 2. Of the inevitable waste that is generated, as many of the waste materials as economically feasible shall be reused, salvaged, or recycled.
 - 3. Waste disposal in landfills shall be minimized.
- B. LEED™ Certification: Contractor shall ensure that the work provided under this section will provide Construction Waste Management to achieve Materials & Resources Credit 2, options 1 and 2 (with goal of 75% minimum diversion from landfill).
 - 1. Credit MRc2, option1 (one point) requires recycling and/or salvaging at least 50% of non-hazardous construction and demolition. Develop and implement a construction waste management plan that, at a minimum, identifies the materials to be diverted from disposal and whether the materials will be sorted on-site or commingled.
 - 2. Credit MRc2, option 2 (one point) requires recycling and/or salvaging of an additional 25% beyond MR Credit 2, option1 (75% total) of non-hazardous construction and demolition, debris.
 - 3. Excavated soil and land-clearing debris does not contribute to this credit. Calculations can be done by weight or volume, but must be consistent throughout.
- C. The Contractor shall ensure that the procedures provided under this section will comply with CAL GREEN 5.508 and with Section 702 – Construction and Demolition Waste Management of the Whitebook.

1.2 SUBMITTALS

- A. Waste Management Plan: Within 10 calendar days after receipt of Notice of Award of Bid, or prior to any waste removal, whichever occurs sooner, the Contractor shall submit to the Resident Engineer a Waste Management Plan. The Plan shall contain the following:
 - 1. List of federal, state, and local laws, regulations, and permits concerning hazardous materials, construction and demolition waste, chemical waste, and sanitary waste that are applicable to the Contractor's proposed operations.
 - 2. Estimate of total project waste to be generated, name of the landfill(s) where Project waste would normally be disposed of, tipping fees, and estimated cost of disposing of project waste in landfill(s).
 - 3. Estimate total tons or cubic yardage of the following waste category to be diverted from landfill.
 - a. Concrete
 - b. Masonry
 - c. Other

4. Estimate of total tons or cubic yards of the following waste categories to be diverted from landfill.
 - a. Clean dimensional wood, palette wood
 - b. Plywood, OSB, and particleboard
 - c. Cardboard, paper, packaging
 - d. Gypsum board (used on site as compost)
 - e. Other
 5. Estimate of amounts (weight, feet, square yards, gallons, etc.) of the following waste categories.
 - a. Metals
 - b. Paint
 - c. Other
 6. Estimate of net cost savings or additional costs resulting from separating and recycling (versus landfilling) each material. "Net" means that the following have been subtracted from the cost of separating and recycling:
 - a. Revenue from the sale of recycled or salvaged materials.
 - b. Landfill tipping fees saved due to diversion of materials from the landfill.
 7. Transportation: A description of the means of transportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site) and destination of materials. Provide an estimate of how often bins will need to be emptied.
 8. Waste Management Plan shall be included under "Materials & Resources Credit 2.1 and 2.2 - Construction Waste Management" in the LEED™ Submittal Documentation in accordance with Section 01 81 13.
- B. Calculation: Provide calculations (using Table MRc2-1 on LEED-OnLine) on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that specified percentage of construction wastes were recycled or salvaged. Contractor shall download, complete and upload the information required to document sustainable criteria values for MR Credit 2 directly on LEED-OnLine.
- C. Submittal with Application for Progress Payments: The Contractor shall submit with each Application for Progress Payment a Summary of the project waste generated. Failure to submit this information shall render the Application for Payment incomplete and shall delay Progress Payment. The Summary shall contain the following information:
1. The amount (in tons or cubic yards) of material landfilled from the Project, the identity of the landfill, the total amount of tipping fees paid at the landfill, and the total disposal cost. Include manifests, weight tickets, receipt, and invoices.
 2. For each material recycled, reused, or salvaged from the Project, include the amount (in tons or cubic yards, pounds, feet, square yards, gallons, etc.), the date removed from the job site, the receiving party, the transportation cost, the amount of any money paid or received for the recycled or salvaged material, and the net total cost or savings of salvage or recycling each material. Attach manifests, weight tickets, receipts, and or invoices.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Plan Distribution: The Contractor shall provide copies of the Waste Management Plan to the Job Site Foreman, each Subcontractor, and the Resident Engineer shall receive 3 copies.
- B. Instruction: The Contractor shall provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the Project.
- C. Meetings: Contractor shall conduct Construction Waste Management meetings. Meetings shall include subcontractors affected by the Waste Management Plan. At a minimum, waste management goals and issues shall be discussed at the following meetings:
 - 1. Pre-bid meetings.
 - 2. Pre-construction meeting.
 - 3. Regularly scheduled job-site meetings.
- D. Separation facilities: The Contractor shall designate a specific area or areas to facilitate separation of materials for potential reuse, salvage, recycling, and return. Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid commingling of materials. Bins shall be protected during non-working hours from off site contamination. Signage on bins, dumpsters and other collection receptacles shall be in English and in Spanish.
- E. Materials Handling Procedures: Materials to be recycled shall be protected from contamination, and shall be handled, stored and transported in a manner that meets the requirements set by the designated facilities for acceptance.
 - 1. Clean contaminated materials prior to placing in collection containers.
 - 2. Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.
 - 3. Arrange for collection by or delivery to the appropriate recycling or reuse facility.
- F. Hazardous wastes: Hazardous wastes shall be separated, stored, and disposed of according to local regulations.
- G. Food Wastes: Food wastes (including packaging and wrappers) shall be properly disposed of immediately and shall be removed daily to minimize or eliminate the attraction of animals.
- H. Rebates, tax credits, and other savings obtained for recycled or reused materials accrue to Contractor.

3.2 WASTE MANAGEMENT OPERATIONS

- A. The following waste categories, at a minimum, shall be separated and diverted from landfill. Appropriately sized, separate collection bins or containers, labeled (in both English and Spanish) for the particular waste categories identified below, shall be provided as follows:
 - 1. Wood:
 - a. Land clearing debris (trees).
 - b. Clean dimensional wood, palette wood.
 - c. Plywood, OSB, and particleboard.
 - 2. Concrete. Crushed on-site and reused as aggregate when feasible.
 - 3. Asphaltic Concrete. .

4. Cardboard, paper, packaging.
5. Cement fiber products (shingles, panels, siding).
6. Asphalt roofing shingles.
7. Metals.
 - a. Ferrous.
 - b. Aluminum.
 - c. Other non-ferrous.
8. Gypsum Drywall (unpainted). (This is may be used on site ascompost)
9. Paint.
10. Rigid Foam.
11. Glass.
12. Plastics (#1 and #2)
 - a. Polyethylene terephthalate (PET). (#1)
 - b. High-density polyethylene (HDPE). (#2)
13. Beverage containers.
14. Insulation
15. Others as appropriate.

B. Recycling/Reuse Centers: Implement a recycling/reuse program that includes separate collection of Reusable building materials, including (but not necessarily limited to) lumber, structural steel, miscellaneous hardware and plumbing and electrical fixtures. The following is a partial list for contractor's information only.

1. Reusable Building Materials:
 - a. Habitat for Humanity, (800) HABITAT.
 - b. California Materials Exchange (CAL-MAX) Program sponsored by the California Integrated Waste Management Board.
 1. CAL-MAX is a free service provided by the California Integrated Waste Management Board, division of the California Environmental Protection Agency, designed to help businesses find markets for materials that traditionally would be discarded. The premise of the CAL-MAX Program is that material discarded by one business may be a resource for another business.
 2. To obtain a current Materials Listings Catalog:
 - a) call CalRecycle Local Assistance and Market Development (916) 341-6199
 - b. See <http://www.calrecycle.ca.gov/calmax/>
2. Asphalt: For information on recycling/reuse of asphalt, contact the Asphalt Recycling and Reclaiming Association (410) 267-0023.
3. Wood (lumber, trees, etc.): Wood Recycling, Inc. (www.woodrecycling.com)
4. Plastics Only:
 - a. (information) Vinyl Environmental Resource Center of the Vinyl Institute; (800) 969-8469
 - b. (information) American Plastics Council (800) 2-HELP-90.
5. Plastic "peanut" packing materials: (information) The Association of Foam Packaging Recyclers (202) 974-5351.
6. Used Paint and Used Paint Cans:
 - a. Green Paint Company (800) 527-8866.
 - b. (public and private agencies only) Major Paint Company (310) 542-7701.
 - c. (paint cans only - information) Steel Can Recycling Institute (SCRI); (800) 937-1226

7. Fluorescent and HID lamps and ballasts.
 - a. AERC.com, Inc., Hayward, CA (800) 628-3675, www.aercrecycling.com
 - b. Ecolights Northwest, Seattle, WA (206) 343-1247, www.ecolights.com
 - c. Environmental Light Recyclers, Inc., Fort Worth, TX (800)755-4117.
 - d. Full Circle Recyclers, Bronx, NY (800) 775-1516, www.fcrecyclers.com
 - e. HTR-Group, Lake Ozark, MO (888) 537-4874, www.htr-group.com
 - f. Institution Recycling Network, Concord, NH (603) 229-1962, www.ir-network.com.
 - g. Northeast Lamp Recycling, Inc., East Windsor, CT (860)292-1992
 - h. Onyx special Services, Port Washington, WI (800) 556-5267, www.superiorserv.com.

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SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 FINAL CLEANING

- A. Perform the following special cleaning for trades at completion of Work. Employ experienced workmen or professional cleaners for the final cleaning:
1. Remove marks, stains, fingerprints, soil and dirt from paint, stain and wall covering.
 2. Remove spots, soil, paint and mastic from tile work and wash same.
 3. Clean fixtures, equipment and piping; remove stains, paint, dirt and dust.
 4. Remove temporary floor protections; clean and polish floors.
 5. Clean concrete walks and slabs of plaster or cement droppings, paint and other objectionable materials to present a neat, clean appearance.
 6. Clean exterior and interior metal surfaces, including doors and windows and their frames.
 7. Remove oil, stains, dust, dirt, paint and the like from items required to have a polished finish; polish and leave without finger marks or other blemishes.
 8. Wash glass inside and outside.
- B. Cleaning materials and procedures shall be non-toxic and in accordance with the requirements of Section 01 81 13. Provide alternative materials to more toxic commercial cleaning agents, including; but not limited to: vinegar, citrus, borax, cornstarch, and baking soda.
1. Abrasive cleaners: Substitute half lemon dipped in borax.
 2. Ammonia: Substitute vinegar, salt, and water mixture; or backing soda and water.
 3. Disinfectants: Substitute half cup borax in a gallon of water.
 4. Drain Cleaners: Substitute one-fourth cup baking soda and one-fourth cup vinegar in boiling water.
 5. Upholstery cleaners: Substitute dry cornstarch.
- C. Make building(s) ready for occupancy in every respect. Lay heavy building paper (rosin paper or kraft paper ONLY, asphaltic based papers are NOT acceptable) in main circulation areas to protect the floors until final inspection and acceptance.
- D. Existing improvements, inside or outside the property which are disturbed, damaged or destroyed by the Work under the Contract shall be restored to the condition in which they originally were, or to the satisfaction of the Resident Engineer.

1.2 CONSTRUCTION IAQ MANAGEMENT PLAN (LEED EQ Credit No. 3.2)

- A. In accordance with requirements specified in Section 01 35 46 – Indoor Air Quality Management.

1.3 PROJECT RECORD DOCUMENTS

- A. As the work progresses, the Contractor shall maintain a complete and accurate record of changes or deviations from the Contract Documents and Shop Drawings, indicating the Work as actually installed. Record information in the appropriate locations on a record set of prints of the Drawings and Shop Drawings and a copy of the Specifications which are maintained solely for the purpose of this documentation. Keep this record set of Contract Documents and Shop Drawings at the project site for review by the Owner and Architect. Information contained in the record documents shall include, but not be limited to:
1. Modifications made by Addenda, Change Orders, Construction Change Directives and Resident Engineer's Supplemental Instructions which shall be transferred to the record documents.
 2. Location of site underground pipes, conduits, ducts, cables and similar work, dimensioned horizontally to permanent points of reference and located vertically by indicating depth of burial. Dimensions shall be accurate within ± 6 inches.
 3. Location of building plumbing piping, sprinkler piping, control valves, heating and air conditioning equipment, mechanical piping, ductwork, major conduit runs, power, control and alarm wiring, etc., dimensioned horizontally to permanent points of reference. Dimensions shall be accurate within 6 inches. By notation, describe the vertical location of the item such as "below slab," "above ceiling," etc.
 4. Modifications made to accommodate field conditions.
 5. Location and function of mechanical and electrical control devices and shut-off valves.
 6. Revise Drawings and panel schedules to show final circuiting of electrical fixtures and equipment.
- B. The Resident Engineer will provide the Contractor with a set of reproducible drawings, of the complete original bidding documents, at Contractor's expense. Seals and signatures of Registrants shall be completely removed and/or permanently obscured. Contractor shall provide the following on the Drawings:
1. Changes in the Contract Documents, secured with prior approval of the Resident Engineer, recorded in a neat readable manner, in black ink, by a competent drafter. Deletions shall be made by erasure or sepia eradicator only.
 2. Prior to application for final payment, transfer all changes, information and notations made to the record prints to a reproducible set.
- C. Upon Substantial Completion of the Work, deliver the complete set of Record Documents including prints, reproducible set, Shop Drawings and annotated Specifications to the Resident Engineer for approval.
- D. Owner's Manual: Prior to final payment, submit one (1) hard-back, loose-leaf binder containing the following required submittals and any others required in other Sections, suitably typed, indexed and labeled for ready reference:
1. Subcontractors, major suppliers list with companies names, addresses and telephone numbers.
 2. Warranties and certifications.
 3. Affidavit from general and subcontractors on use of asbestos free materials.
 4. Maintenance/operation instructions and parts list (other than Divisions 15 and 16).
 5. List of Extra Materials supplied to Owner, signed by Owner's representative.
 6. Other items required by the Specifications.
 7. Electronic copy of documents on CD and/or DVD.

- E. LEED Submission Documentation: In accordance with Section 01 81 13.

1.4 OPERATION AND MAINTENANCE DATA

- A. Initial Submittal:
 - 1. Submit two draft copies of Operating and Maintenance Manuals for systems and equipment, including electrical and control items, and parts lists, a minimum of 14 days prior to requesting inspection for Substantial Completion, or scheduled Substantial Completion Date, whichever is earlier. Furnish separate copies for each Division.
 - 2. Resident Engineer will review Manual for general scope and content and return one copy of draft manuals with required action.
- B. Operating instructions shall include complete operating sequence, control diagrams, description of method of operating machinery, machine serial numbers, factory order numbers, parts, tests, instruction books, suppliers phone numbers and addresses and individual equipment guarantees. Parts lists shall be complete in every respect, showing parts and part numbers for ready reference.
- C. Maintenance instructions shall include a written list of required and suggested maintenance for mechanical, plumbing, electrical or other equipment or features in the project. Each item shall contain a brief description of the maintenance required as well as the recommended time frame or period for the maintenance. Include lists of filter sizes for air handling equipment, indicated "washable" or "disposable" and for which unit the filter is for. Shut off valves, etc., must be clearly marked on as-constructed drawings.
- D. Where available from the manufacturer, provide operating and maintenance instructions and videos on electronic media for each specific equipment item or system.
- E. Assemble maintenance manual and operating instructions in hard back loose leaf binders. Suitably label and index material for ready reference.
- F. Upon substantial completion of the Project Work, submit one copy of the Maintenance Manual and Operating Instructions to the Resident Engineer for approval. Upon receipt of Notice of Approval, deliver the additional copy to the Owner. Include operating and maintenance instruction and videos on electronic media.

1.5 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Deliver spare parts, tools, extra stocks of material and similar physical items required by individual specification sections to the Owner with a copy of the transmittal to the Owner. Obtain signed receipts from the Owner for all items.
- B. Change over construction locks to permanent keying system. Deliver required number of keys to the Owner with a copy of the transmittal to the Resident Engineer. Obtain receipts from the Owner for delivered items.

1.6 ELECTRONIC COPIES OF IMAGE DOCUMENTS

- A. Upon completion provide CD or DVD disk(s) containing image copies in JPEG, PDF or other appropriate electronic format of all record and maintenance documents.

1.7 WARRANTIES

- A. Provide duplicate, notarized copies of documents required in the General Conditions.
- B. Submit warranties required by individual specification Sections in duplicate, assembled in durable binders with a Table of Contents.
- C. The date of commencement of warranties shall be the date of Substantial Completion except as may be modified by AIA Document G-704, Certificate of Substantial Completion, or by other written agreement with the Owner.

END OF SECTION

SECTION 01 81 13

SUSTAINABLE DESIGN REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Procedures required of the Contractor to ensure that construction procedures and documentation required for LEED™ Certification and CALGreen are provided.

1.2 DEFINITIONS

- A. LEED Green Building Rating System:
1. "LEED™": Leadership in Energy and Environmental Design.
 2. "USGBC": US Green Building Council. See Section 01 42 00 -References.
 3. "GBCI": Green Building Certification Institute.
 4. "CALGreen": 2010 Title 24, Part 11, California Green Building Standards Code.
- B. Prerequisite: Requirements which must be met in order to achieve LEED™ Certification. Non-compliance with any prerequisite may be cause for failure of Certification and is not acceptable.

1.3 SYSTEM DESCRIPTION

- A. LEED™ Certification:
1. The LEED Green Building Rating System™ is a voluntary, consensus-based, market-driven building rating system based on existing proven technology. It evaluates environmental performance from a whole building perspective over a building's life cycle, providing a definitive standard for what constitutes a "green building".
 2. The development of LEED Green Building Rating System™ was initiated by the USGBC Membership, representing all segments of the building industry and has been open to public scrutiny.
 3. In 2008, the review of the submittals for building certification was changed to the GBCI.
 4. LEED™ is a measurement system designed for rating new and existing commercial, institutional, and residential buildings. It is based on accepted energy and environmental principles and strikes a balance between known established practices and emerging concepts. It is a performance-oriented system where credits are earned for satisfying criterion designed to address specific environmental impacts inherent in the design, construction and O&M of buildings. Different levels of green building certification are awarded based on the total credits earned. The system is designed to be comprehensive in scope, yet simple in operation.
 5. There are a total of 110 points available in the LEED-NC v3 (2009) ratingsystem.
 - a. 40 points are required for a building to be LEED Certified.
 - b. 50 points: "Silver Level" rating.
 - c. 60 points: "Gold Level" rating.
 - d. 80 points: "Platinum Level" rating
 6. The Owner of this project intends to achieve a Silver Level rating in accordance with the Project Checklist which follows this section.
 7. Information regarding the LEED rating system is available at <http://new.usgbc.org/leed/rating-systems>

- B. CALGreen Compliance: The California Green Building Code (CALGreen) went into effect January 1, 2011 and the mandatory provisions are applicable to this project. Information regarding CALGreen is available at <http://www.bsc.ca.gov/Home/CALGreen.aspx>

1.4 SUBMITTALS

A. LEED™ Submittal Documentation:

1. Upon completion of the Project, the Owner will be making a submission to the GBCI for certification. This submission will require documentation provided by the Contractor.
2. Throughout the Technical Specifications, various submission requirements are specified that shall be collected and compiled into a separate file by the Contractor prior to, during, and after the course of construction.
3. Product data required for LEED submittal shall be submitted electronically to LEED-OnLine concurrent with the submittals to the Resident Engineer.
4. LEED-OnLine:
 - a. At the time of Project Registration during the design phase of the project, the project team identified a Project Administrator (GrEn A/E Consultants LLC), who has assigned design team members to each applicable LEED prerequisite/credit.
 - b. Upon execution of Contract, the Contractor will be invited to participate in the LEED-Online process. Contractor shall accept the assignments and shall cooperate and participate in the preparation of the LEED Templates at no additional cost to the Owner. Prerequisites/credits that are noted as "Assign" in the Assignee column of the LEED-OnLine scorecard will be those assigned to the Contractor.
 - c. The Contractor shall complete the LEED-OnLine documentation (forms and supporting documentation) which is assigned to the Contractor. The Project Administrator shall review periodically to ensure that the documentation provided has been uploaded. The Project Administrator will provide familiarization assistance to the Contractor, however, the Contractor shall be responsible for the training of Contractor's personnel in the usage of LEED-Online.
 - d. Once each prerequisite/credit is completed, the Project Administrator will submit the project for review at the appropriate time.
 - e. Credits marked as "Construction" will be submitted and reviewed by GBCI after the substantial completion of construction. The GBCI will review and mark each credit as "Anticipated/Achieved," "Pending" or "Denied". Project team members may be contacted for additional information or clarification for claiming the credit and meeting the credit intent and shall assist the Project Administrator in any resubmittal required. The design/construct team will receive a ruling on every credit that is submitted, with a brief explanation of why any credits are pending or were denied. The certification review process will be documented in the LEED-Online exclusively.
 - f. Should clarification be required of a prerequisite or credit assigned to the Contractor, the Contractor shall provide the required response to that clarification request by GBCI.
 - g. The design/construct team will receive a ruling on every credit that is submitted, with a brief explanation of why any credits were denied. The certification review process will be documented in the LEED-Online exclusively.

- h. Certification Award: The results of the Design Submittal and Construction Submittal will be combined to determine project certification and the corresponding rating level (Certified, Silver, Gold, Platinum). Notification of the project's LEED Rating will be made via the LEED-Online by USGBC/GBCI certification staff. The project team may choose to accept the rating or appeal one or more credits.
 - i. Appeals: If any party decides to appeal a certification ruling, the project will be assigned to another USGBC/GBCI Reviewer. The new USGBC/GBCI Reviewer will examine the credit information provided in the LEED-Online and any additional information provided in the Appeal Notification. Within 10 days of appeal, the appeal reviewer will make a final determination. Should appeal of a prerequisite/credit to which the Contractor is assigned be required, the additional costs and fees shall be borne by the Contractor. If a Prerequisite assigned to the Contractor be denied, the Contractor shall appeal the denial at no additional cost to Owner. The appeal process shall be completed so that the prerequisite is attained.
- B. Erosion and Sedimentation Control - Sustainable Sites Prerequisite: Provide electronically submittals in accordance with Section 01 57 13- Temporary Erosion and Sediment Control.
- C. Construction Waste Management - Materials and Resources Credit 2.1 and 2.2: Provide submittals as specified in Section 01 74 19 - Construction Waste Management and Disposal.
- D. Recycled Content:
 - 1. Materials and Resources Credit 4: Provide the following electronically.
 - a. Product data submittals, in accordance with the requirements of Section 01 33 00- Submittal Procedures and as specified in the various specification sections, highlighting recycled content (as defined in Section 01 60 00).
 - b. Provide spreadsheet of all materials used on the project highlighting recycled content materials. Include the percentage of post-consumer and pre-consumer recycled content for recycled content materials, the costs of all materials for the project, and calculations demonstrating that sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes a minimum of 20% based on cost of the total value of the materials in the project.
 - 2. Mechanical, electrical and plumbing components and specialty items such as elevators shall not be included in calculations for this credit. Only include Division 3-10 materials permanently install in the project.
- E. Regional Materials:
 - 1. Materials and Resources Credit 5: Provide the following electronically.
 - a. Product data submittals, in accordance with the requirements of Section 01 33 00 - Submittal Procedures and as specified in the various specification sections, highlighting regional (as defined in Section 01 60 00) materials.
 - 1) Location of the manufacturer must be verified by a product cut sheet or letter from the manufacturer.
 - 2) Manufacturer information shall state the location of extraction, harvest or recovery of all components used in the material or product.

- b. Provide spreadsheet of all materials used on the project highlighting regional materials. Include the location of the material manufacturer, the distance from the manufacturer to the project site, the costs of all materials for the project, and calculations demonstrating that a minimum of 20% of the building materials based on cost have been extracted, harvested or recovered, as well as manufactured, within 500 air miles of the project.

- F. Rapidly Renewable Materials:
 - 1. Materials and Resources Credit 6: Provide the following electronically.
 - a. Product data submittals, in accordance with the requirements of Section 01 33 00 – Submittal Procedures and as specified in the various specification sections, highlighting rapidly renewable (as defined in Section 01 60 00) materials.
 - b. Provide spreadsheet of all materials used on the project highlighting rapidly renewable materials. .

- G. Low Emitting Materials -
 - 1. Indoor Environmental Quality Credit 4.1: Provide the following electronically.
 - a. Properly completed Products Form (00 62 33).
 - b. Provide a cut sheet and / or material safety datasheet (MSDS) for all adhesives used, with VOC levels highlighted. No other information contained on MSDS sheet shall be reviewed.
 - c. Provide in accordance with Section 01 60 00– Product Requirements.
 - 2. Indoor Environmental Quality Credit 4.2: Provide the following electronically.
 - a. Properly completed Products Form (00 62 33).
 - b. Provide a cut sheet and / or material safety datasheet (MSDS) for all coating applied on-site in the building, with VOC levels highlighted. No other information contained on MSDS sheet shall be reviewed.
 - c. Provide in accordance with Section 01 60 00– Product Requirements.
 - 3. Indoor Environmental Quality Credit 4.3: Provide the following electronically.
 - a. Properly completed Products Form (00 62 33).
 - b. Provide a cut sheet and / or material safety datasheet (MSDS) for all carpet systems used in the building, with VOC levels highlighted. No other information contained on MSDS sheet shall be reviewed.
 - c. Provide in accordance with Section 01 60 00– Product Requirements.
 - 4. Indoor Environmental Quality Credit 4.4: Provide the following electronically.
 - a. Properly completed Products Form (00 62 33).
 - b. Provide a cut sheet and / or material safety datasheet (MSDS) for all composite wood products used in the building, with VOC levels highlighted. No other information contained on MSDS sheet shall be reviewed.
 - c. Provide in accordance with Section 01 60 00 – Product Requirements.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 CONSTRUCTION IAQ MANAGEMENT (LEED EQ Credits No. 3.1 and 3.2)

- A. In accordance with plan and requirements specified in Section 01 35 46 – Indoor Air Quality Management.

3.2 CALGreen ENFORCEMENT:

- A. CALGreen will be enforced in the same manner as other Building Codes.
 - 1. The construction documents have been through plan check review for compliance with CALGreen.
 - 2. Final inspections by City inspectors for CALGreen criteria will be conducted before Certificate of Occupancy is granted.

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LEED 2009 for New Construction and Major Renovations

Project Checklist

San Diego fire Station 22

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20 6 Sustainable Sites Possible Points: 26

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

2 8 Water Efficiency Possible Points: 10

Y	?	N	Prereq	Description	Points
2		2	Prereq 1	Water Use Reduction—20% Reduction	
		2	Credit 1	Water Efficient Landscaping	2 to 4
		4	Credit 2	Innovative Wastewater Technologies	2
		4	Credit 3	Water Use Reduction	2 to 4

19 16 Energy and Atmosphere Possible Points: 35

Y	?	N	Prereq	Description	Points
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
15		4	Credit 1	Optimize Energy Performance	1 to 19
4		3	Credit 2	On-Site Renewable Energy	1 to 7
		2	Credit 3	Enhanced Commissioning	2
		2	Credit 4	Enhanced Refrigerant Management	2
		3	Credit 5	Measurement and Verification	3
		2	Credit 6	Green Power	2

6 1 7 Materials and Resources Possible Points: 14

Y	?	N	Prereq	Description	Points
		3	Prereq 1	Storage and Collection of Recyclables	
		1	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
2			Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
		2	Credit 2	Construction Waste Management	1 to 2
		2	Credit 3	Materials Reuse	1 to 2

Materials and Resources, Continued

Y	?	N	Credit	Description	Points
2			Credit 4	Recycled Content	1 to 2
2			Credit 5	Regional Materials	1 to 2
		1	Credit 6	Rapidly Renewable Materials	1
		1	Credit 7	Certified Wood	1

8 7 Indoor Environmental Quality Possible Points: 15

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

1 5 Innovation and Design Process Possible Points: 6

Y	?	N	Credit	Description	Points
		1	Credit 1.1	Innovation in Design: Specific Title	1
		1	Credit 1.2	Innovation in Design: Specific Title	1
		1	Credit 1.3	Innovation in Design: Specific Title	1
		1	Credit 1.4	Innovation in Design: Specific Title	1
		1	Credit 1.5	Innovation in Design: Specific Title	1
1			Credit 2	LEED Accredited Professional	1

1 3 Regional Priority Credits Possible Points: 4

Y	?	N	Credit	Description	Points
		1	Credit 1.1	Regional Priority: WEC2	1
		1	Credit 1.2	Regional Priority: WEC3	1
1			Credit 1.3	Regional Priority: EAC2	1
		1	Credit 1.4	Regional Priority: IEQc8.1	1

57 6 47 Total Possible Points: 110

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

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SECTION 01 91 00

COMMISSIONING

PART 1 – GENERAL

1.1 REQUIREMENTS INCLUDED

- A. The requirements of the General Conditions, Supplementary Conditions, and Division 1-General Requirements, apply to the work of this Section.
- B. The requirements of this section include building commissioning requirements.
- C. Coordinate with Plumbing; Heating, Ventilating, and Air Conditioning (HVAC); and Electrical requirements.

1.2 RELATED SECTIONS

- A. Division 22 00 00: Plumbing
- B. Division 23 00 00: Heating, Ventilating, and Air Conditioning (HVAC)
- C. Division 26 00 00: Electrical

1.3 DESCRIPTION

- A. Commissioning during the construction phase is a process intended to achieve the following specific objectives:
 - 1. Verify applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted standards and receive adequate operational checkout by installing contractors.
 - 2. Verify and document equipment and systems operate and perform according to the Owner's Project Requirements and the Contract Documents.
 - 3. Verify that the Operations and Maintenance documentation on site conforms to LEED for Green Building Design and Construction 2009 requirements.
 - 4. Verify that the Owner's operating personnel are trained in accordance with LEED for Green Building Design and Construction 2009 and CALGreen 2010 requirements.
- B. Deferred or seasonal commissioning may be required if commissioning during the construction phase does not fulfill the objectives listed above.
- C. Commissioning augments but does not replace close-out procedures or any other testing requirements contained in the contract documents.
- D. Commissioning may continue past substantial completion, until issues of non-compliance have been resolved.

E. Commissioning Schedule

1. Provide schedules for equipment start-up.
2. Incorporate commissioning activities into overall construction master schedule and update as required.

1.4 SYSTEMS TO BE COMMISSIONED

A. This section applies to the following systems

1. Heating, Ventilation, Air Conditioning (HVAC) Systems and Controls
2. Indoor Lighting System and Controls
3. Water Heating System
4. Renewable Energy Systems
5. Landscape Irrigation Systems
6. Water Reuse Systems
7. Building Automation System

1.5 COMMISSIONING TEAM

A. The commissioning team includes:

1. The owner, owner's representative (s), facility staff
2. Commissioning authority (CA)
3. Architect and design engineers (A/E)
4. General contractor, manufacturers, vendors (GC)
5. Sub-contractors

1.6 COMMISSIONING TEAM RESPONSIBILITIES

A. Owner, Owner's Representative (s), Facility Staff

1. Define project requirements and develop written Owner's Project Requirements Document
2. Review the commissioning plan and provide feedback
3. Review the Basis of Design Document and provide feedback
4. Attend commissioning meetings as required
5. Review prefunctional checklists and startup plans

6. Review functional performance test procedures
7. Review training plan

B. Commissioning Authority

1. Direct and coordinate commissioning activities
2. Develop and distribute a Commissioning Plan. Final content authority shall remain with the CA. The plan will include:
 - a. General Information
 1. Project Name, Owner, Location
 2. Building type, Building area
 3. Project Schedule
 4. Contact Information of individual / company providing the commissioning services
 - b. Commissioning Goals
 1. Meeting CALGreen Code requirements for commissioning
 2. Meeting OPR and BOD requirements
 3. Carrying out requirements for commissioning activities as specified in plans and specifications
 - c. Systems to be Commissioned
 1. An explanation of the original design intent
 2. Equipment and systems to be tested, including the extent of tests
 3. Functions to be tested
 4. Conditions under which the test shall be performed
 5. Measureable criteria for acceptable performance
 - d. Commissioning Team Information
 - e. Commissioning Process Activities, Schedules, and Responsibilities
3. Develop commissioning specifications for inclusion in the contract documents
4. Review design prior to mid-construction document phase
5. Provide initial schedule of commissioning activities to the General Contractor
6. Plan and conduct commissioning meetings as required
7. Perform site visits, as necessary, to observe equipment and system installations
8. Review contractor submittals
9. Develop and distribute prefunctional checklists
10. Develop and distribute functional performance test procedures

11. Review test and balance report
12. Coordinate, witness, and approve functional performance test procedures
13. Coordinate re-testing as required
14. Verify training plans and training of owner's personnel
15. Provide final commissioning report
16. Complete LEED documentation
17. Revisit facility 8 – 10 months following substantial completion

C. Architect and Design Engineer

1. Review the Owner's Project Requirements document
2. Develop and provide for review the Basis of Design document
3. Integrate commissioning specifications into the construction documents
4. Review the commissioning plan and provide feedback
5. Evaluate commissioning review comments for possible inclusion into the design
6. Perform site visits, as necessary, to observe equipment and system installations
7. Attend commissioning meetings as required
8. Review prefunctional checklists and startup plans
9. Review and approve the test and balance report
10. Review functional performance test procedures
11. Resolve questions relating to system design
12. Review and approve the Operations and Maintenance manuals
13. Participate in the operator training as required

D. General Contractor, Manufacturers, Vendors

1. Include the cost of commissioning in the total contract price
2. Review commissioning plan and provide feedback
3. Integrate commissioning activities into the construction process and master schedule and update as required

4. Facilitate and support the commissioning process. Coordinate commissioning with sub-contractors.
 5. Attend commissioning meetings as required and provide commissioning meeting minutes
 6. Provide construction submittals, Operations and Maintenance data, and other information to the commissioning authority as requested
 7. Review prefunctional checklists and provide completed checklists to the commissioning authority prior to functional performance testing
 8. Provide completed point-to-point check out verifications prior to functional performance testing
 9. Review test and balance report and provide to the commissioning authority prior to functional performance testing
 10. Review functional performance test procedures
 11. Participate in the resolution of system deficiencies identified during the commissioning process
 12. Prepare Operations & Maintenance manuals
 13. Provide Systems Manual documentation as requested by the commissioning authority and as defined in this section
 14. Develop training plans as defined in this section
 15. Provide as-built drawings including sequences of operation
 16. Coordinate any seasonal or deferred testing
- E. Sub-Contractor (s)
1. Review and execute prefunctional checklists
 2. Review and execute functional performance test procedures under the direction of the commissioning authority
 3. Participate in the resolution of system deficiencies identified during the commissioning process
 4. Provide training as outlined in the training plans

1.7 DEFINITIONS

- A. Commissioning – A quality assurance process beginning in design and continuing through occupancy and beyond. Commissioning verifies new buildings operate as the owner intended and building staff are prepared to operate and maintain its systems and equipment.

- B. Owner's Project Requirements (OPR) – A written document detailing the functional requirements of a project and the expectations of how it will be used and operated. These include project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.
- C. Basis of Design – A document recording the concepts, calculations, decisions, and product selections used to meet the Owner's Project Requirements and to satisfy applicable regulatory requirements, standards and guidelines. The document includes both narrative descriptions and lists of individual items supporting the design process.
- D. Commissioning Plan – A document outlining the organization, schedule, allocation of resources, roles and responsibilities of the commissioning process.
- E. Commissioning Authority – The entity leading, planning, scheduling, and coordinating the commissioning process.
- F. Prefunctional Checklist – A form used by the contractor and sub-contractors to verify and demonstrate system components are correctly installed and functional.
- G. Functional Performance Test Procedure – A step-by-step written protocol defining methods, personnel, and expectations for tests conducted on components, equipment, assemblies, systems, and interfaces between systems.
- H. Acceptance Criteria – The conditions which must be met for systems /equipment.
- I. Deficiency – A condition in the installation or function of a component or system not in compliance with the contract documents, Owner's Project Requirements, or Basis of Design.
- J. Issues Log – A formal on-going record of problems or concerns – and their resolution – that have been raised by members of the commissioning team throughout the commissioning process.
- K. Systems Manual – A system focused composite document that includes the operations manuals, maintenance manuals, and additional information of use to the owner to allow for the operation of the installed systems.

PART 2 – PRODUCTS

2.1 TEST EQUIPMENT

- A. Provide required test equipment, instruments and components for measurements, verifications, and commissioning of systems listed in paragraph 1.04 of this Section.
- B. Instruments shall be calibrated in accordance with the National Institute of Standards and Technology (NIST).
- C. Any required test equipment shall be included in the based price bid by the Contractor.

PART 3 – EXECUTION

3.1 PREFUNCTIONAL CHECKLISTS AND START-UP PLANS

- A. The Commissioning agent (CA) shall develop prefunctional checklists above and beyond the Contractor's start-up forms.
- B. The prefunctional checklists shall be provided to the Owner who shall distribute to the Contractor for review and comment. Final content authority shall remain with the CA.
- C. The prefunctional checklists do not replace manufacturer start-up forms.
- D. Provided to the CA a minimum of three months prior to equipment startup, submittals include but are not limited to:
 - 1. Contractor start-up forms
 - 2. Manufacturer start-up forms
 - 3. Point-to-point checkout verification forms
- E. The prefunctional checklists, Contractor start-up forms, controls point-to-point check out forms, and manufacturer start-up forms shall be combined to form the start-up plans.
- F. The Contractor shall insert the start-up plans into clear plastic sheaths and affix them to their respective piece of equipment or maintain the start-up plans in binders accessible to the personnel performing the work.
- G. The start-up plans shall be executed by the Contractor who may assign this task to a sub-contractor, vendor, or other party responsible for equipment installation.
- H. Only individuals that have direct knowledge of an item in the start-up plans shall initial the item as complete.
- I. The CA shall observe the start-up of selected equipment.
- J. The contractor shall list items not in conformance with the start-up plans and explain any outstanding items not successfully completed at the bottom of the applicable prefunctional checklist.
- K. Within one week after completion of the start-up plan the Contractor shall provide the CA with a signed and dated copy.
- L. The responsible party shall correct areas that are deficient or incomplete in a timely manner, and shall notify the CA as soon as outstanding items have been corrected and submit an updated start-up report.
- M. Start-up plans shall be repeated, as necessary, until the deficiencies have been corrected.
- N. Items left incomplete, which later cause deficiencies or delays during functional performance testing shall result in back charges to the responsible party.

O. The CA shall accept or reject each start-up plan, with one of the following:

1. No Exception Taken
2. Revise, No Resubmission Required
3. Revise and Resubmit
4. Rejected

P. A sampling strategy is not allowed.

3.2 CONTRACTOR SUBMITTALS

A. Submittals applicable to the systems listed in paragraph 1.04 of this Section shall be copied to the CA for review in parallel with the normal distribution / review process. Submittals for commissioned equipment and systems will be reviewed for quality assurance and compliance with the Owner's Project Requirements. Information may include, but is not limited to:

1. Equipment cut sheets
2. Shop drawings
3. Test and Balance Plan
4. Installation manuals and manufacturer startup forms
5. Control drawings and detailed sequences of operation
6. Building automation system points list

B. The CA does not have the authority to approve or reject the submittals, but may provide comment.

C. If the CA does not provide comments, this may not be accepted as a reason for a claim of delay or for a time extension by the Contractor.

3.3 COMMISSIONING MEETINGS

A. The CA shall schedule, plan and conduct a commissioning kick off meeting.

B. At the discretion of the CA, subsequent commissioning meetings shall be planned and conducted as required. Typically the frequency increases as construction nears completion, at which time meetings may be held as frequently as on per week.

C. Whenever possible the meetings shall be held in conjunction with, prior to, or following other team meetings.

D. The meetings shall cover commissioning coordination and deficiency resolution.

E. The meetings shall be held at the Contractor's site office or other on-site location agreed to between the Owner, Commissioning Agent, and Contractor.

F. As required the following may be requested to attend:

1. Contractor's site superintendent
2. Mechanical and electrical sub-contractors
3. Other parties involved in Work.

- G. Contractor's representatives shall be qualified and authorized to act on behalf of party each represents.
- H. The Contractor shall record meeting minutes and distribute copies to attendees within three(3) working days after meeting.

3.4 FUNCTIONAL PERFORMANCE TESTING

A. Objectives and Scope

- 1. The objective of functional performance testing is to demonstrate each system is operating according to the Owner's Project Requirements and contract documents.
- 2. Functional performance testing facilitates bringing the systems from a state of substantial completion to full dynamic operation.
- 3. During the testing process, areas of deficient performance are identified and corrected.
- 4. Each system to be commissioned shall be operated through its modes of operation (e.g. occupied, unoccupied, warm-up, cool-down, part-load, etc.). Proper responses to conditions such as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested.

B. Development of Test Procedures

- 1. Before test procedures are developed the CA shall be provided with requested documentation and a current list of change orders affecting equipment or systems, including but not limited to an updated points list, control sequences of operation, program code, and operating parameters.
- 2. The CA shall develop test procedures to verify and document proper operation of each piece of equipment and system.
- 3. Prior to the execution of the test procedures, the Contractor and A/E team shall review and comment on the test procedures. Final content authority shall remain with the CA.
- 4. The test procedure forms shall include, but not be limited to the following information:
 - a. Date and Party
 - b. Signature Block
 - c. Prerequisites
 - d. Precautions
 - e. Instrumentation
 - f. Reference
 - g. Test Instructions

- h. Acceptance Criteria
- i. Results
- j. Return to Normal
- k. Deficiencies

C. General Functional Test Methods

1. Functional testing shall be achieved by manual testing and by monitoring the system performance and analyzing the results using the building automation system's trend log capabilities.
2. Functional testing sequence
 - a. Functional testing shall not be conducted until after the start-up plans have been accepted by the CA.
 - b. Functional testing shall not be conducted until after the air and water balancing is completed and approved.
 - c. Functional testing proceeds from components to subsystems to systems. When proper performance of interacting systems has been achieved, the interface or coordinated responses between the systems shall also be verified.
3. Functional Test Setup
 - a. Each functional test shall be performed under conditions that simulate actual conditions as close as is practically possible.
 - b. The sub-contractor executing the test shall provide necessary materials, system modifications, etc. to produce flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions.
 - c. At the completion of the test the sub-contractor shall return affected building equipment and systems to their pre-test condition.
4. Functional Test Sampling
 - a. At the discretion of the CA multiple identical pieces of non-critical equipment may be functionally tested using a sampling strategy.
 - b. Significant application differences and significant sequence of operation differences in otherwise identical equipment invalidates their common identity. A small size or capacity difference, alone, does not constitute a difference.

D. Coordination and Scheduling

1. The Contractor shall incorporate commissioning items into the construction master schedule.

2. The CA shall schedule functional performance testing through owner, who shall in turn coordinate with the Contractor. The CA may coordinate directly with the Contractor with the approval of the owner.
3. The CA shall direct, witness, and document the functional performance testing.
4. The Contractor and sub-contractors shall execute the test procedures as directed.

E. Control Signal Manipulation

1. Actual Conditions: Testing system and equipment to experience actual operating conditions and legitimate control signals is preferred, although it will not be feasible that the system to be commissioned will experience the full range of operating conditions within the testing period.
2. Simulated Conditions: Simulating conditions shall be used as necessary in order to test the systems in different operating conditions.
3. Overwritten Values: Overwriting sensor values to simulate a condition shall be at the discretion of the CA.

F. Simulated Signals: Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is acceptable.

1. Altering Set points: Altering system set points is acceptable and shall be employed as necessary.

G. The CA may recommend solutions to issues, however the burden of responsibility to solve, correct, and retest problems is with the Contractor, sub-contractors, and A/E.

3.5 DEFERRED AND SEASONAL TESTING

A. Unforeseen Deferred tests

1. If a check or test cannot be completed due to the building structure, required occupancy condition, or other situation, execution of the start-up plans or functional performance testing may be delayed upon approval of the owner.
2. The tests shall be conducted as soon as possible.
3. Services of necessary parties shall be negotiated.

B. Seasonal Testing

1. During the warranty period, seasonal testing (tests delayed until weather conditions are closer to the system's design conditions) shall be completed as part of this contract.
2. The CA shall coordinate this activity through the owner.
3. Tests shall be executed and deficiencies corrected by the appropriate sub-contractors, with the owner's operator (s) and the CA witnessing, directing and documenting. Final adjustments to the Operation and Maintenance Manuals and as-built drawings due to the testing shall be made by the Contractor.

3.6 NON COMPLIANCE

- A. The CA shall document the results of the functional performance testing on the procedure or test form. Deficiencies or non-compliance issues shall be noted and reported to the owner and Contractor.
- B. Corrections of minor deficiencies shall be made during the tests at the discretion of the CA. In such cases the deficiency and resolution shall be documented on the procedure form.
- C. Where there is no dispute on the non-compliance issue and the sub-contractor accepts responsibility to correct it.
 - 1. The CA documents the deficiency, remediation and the sub-contractor's intention to correct the deficiency and continues with the functional performance test, if possible, or executes another functional performance test or procedure.
 - 2. The portions of the functional performance test procedure determined to be in non-compliance shall be repeated when the Contractor indicates the issue has been corrected.
- D. If there is a dispute about a non-compliance issue, regarding if it is in fact a deficiency, the party responsible for correction, or the appropriate correction:
 - 1. The deficiency shall be documented by the CA along with the sub-contractor's response and provided to the owner and Contractor.
 - 2. Resolutions shall be made at the lowest possible management level. Additional parties may be involved if required. Final design interpretive authority is with the A/E. Final acceptance authority is with the owner.
 - 3. The resolution process shall be documented by the CA.
 - 4. If the final interpretation is an issue requiring resolution exists, the portions of the functional performance test procedure originally determined to be in non-compliance shall be repeated when the Contractor indicates the issue has been corrected.
- E. The cost for a sub-contractor to repeat a prefunctional checklist or functional performance test, if they are responsible for the deficiency shall be theirs.
- F. For an identified deficiency that is not related to a prefunctional checklist or start-up fault, the following is applicable:
 - 1. The CA shall direct the retesting of the equipment once at no charge to the Contractor.
 - 2. If additional testing is required, the costs shall be charged to the Contractor.
- G. The time for the CA to direct retesting as a result of a prefunctional checklist item reported to have been successfully completed, but determined during functional testing to be faulty, shall be charged to the Contractor.
- H. Retesting shall not be accepted as a reason for a claim of delay or for a time extension by the Contractor.
- I. The CA may assist with deficiency resolution, however final responsibility for resolving identified deficiencies lies with the Contractor.

3.7 SYSTEMS MANUAL

- A. In accordance with LEED Reference Guide for Green Building Design and Construction 2009 Edition and CALGreen Section 5.410.2.5.1 Systems Manual, the Contractor shall provide the following documentation for each equipment type and/or system listed in paragraph 1.04 of this Section for inclusion in the Systems Manual.
1. Record as-built drawings and documents (including single-line diagrams)
 2. Final as-built control drawings and schematics
 3. Final as-built control sequences of operation
 4. Construction documents – Location or delivery information
 - a. Mechanical and electrical drawings
 - b. Specifications
 - c. Submittals
 - d. Project change orders and information
 5. Current requirements
 - a. Building operating schedules
 - b. Space temperature, humidity and pressure, CO2 setpoints
 - c. Summer and winter setback schedules
 - d. Chilled and hot water temperatures
 - e. As-built control setpoints and parameters
 6. Site contact information
 - a. Owner information
 - b. Emergency contacts
 - c. Design team; architect, mechanical engineer, electrical engineer, etc.
 - d. Prime contractor contact information
 - e. Sub-contractor information
 - f. Equipment supplier contact information

7. Basic operation and maintenance, including general site operating procedures, basic trouble shooting, recommended maintenance requirements, site events log
 - a. Basic Operation
 1. Written narratives of basic equipment operation
 2. Operating instructions for integrated building systems including Interfaces, interlocks, and interaction with other equipment and systems
 3. Initial maintenance provided by Contractor
 - b. General Site Operating Instructions
 1. Instructions for changes in major system operating schedules
 2. Instructions for changes in major system holiday and weekend schedules
 - c. Basic Trouble Shooting
 1. Cite any recommended troubleshooting procedures specific to the major systems and equipment installed in the building
 2. Manual operation procedures
 3. Bypass operation procedures
 4. Major system power fail resets and restarts
 5. Trend log listing
 - d. Recommended Maintenance Events Log
 1. HVAC air filter replacement schedule and log
 2. Building control system sensor calibration schedule and log
 3. Recommended schedule of maintenance requirements and frequency, if not already included in the Project O&M manuals
 - e. Operation and Maintenance Manuals – location or delivery information
8. Major Systems
 - a. HVAC Systems and Controls
 1. Air conditioning equipment (chillers, cooling towers, pumps, heat exchangers, thermal energy storage tanks, etc.)
 2. Heating equipment (boilers, pumps, tanks, heat exchangers, etc.)
 3. Air distribution equipment (fans, terminal units, accessories, etc.)
 4. Ventilation equipment (fans, accessories, and controls)
 5. Building automation system (workstation, servers, panels, variable frequency drives, local control devices, sensors, actuators, thermostats, etc.)
 - b. Indoor Lighting Systems and Controls
 1. Lighting control panels
 2. Occupancy sensors
 3. Daylight harvesting systems

- c. Renewable Energy Systems
 - 1. Photovoltaic panels and inverters
 - 2. Wind powered electrical generators and inverters
- d. Landscape Irrigation Systems
 - 1. Water distribution diagrams
 - 2. Control system
- e. Water Reuse Systems
 - 1. Reclaimed water system for indoor use
 - 2. Reclaimed water for irrigation use
- 9. Site Equipment Inventory and Maintenance Notes
 - a. Spare parts inventory
 - b. Frequently required parts and supplies
 - c. Special equipment required to operate or maintain systems
 - d. Special tools required to operate or maintain systems
 - e. A copy of special inspection verifications required by the enforcing agency of this code
 - f. Other resources and documentation

3.8 SYSTEMS OPERATION TRAINING

- A. In accordance with CALGreen Section 5.410.2.5.2 Systems Operation Training, the Contractor shall develop a written training plan and provide training to the appropriate facility staff for each equipment type and/or system listed in paragraph 1.04 of this Section.
- B. The written training plan includes:
 - 1. Learning goals and objectives for each session
 - 2. Training agenda, topics, and length of instruction for each class session
 - 3. Instructor information and qualifications
 - 4. Location of training sessions (onsite, off-site, manufacturer's or vendor's facility)
 - 5. Attendance forms
 - 6. Training materials
 - 7. Description on how the training will be archived for future use

C. For each system the following shall be included:

1. Systems / Equipment Overview

- a. Review Owner's Project Requirements and Basis of Design related to the major systems and equipment
- b. Describe system type and configuration
- c. Explain operation of all major systems and equipment and how it interfaces with other systems and equipment
- d. Describe operation of control system for each system, location of critical control elements, and procedures to properly operate control system
- e. Review recommendations for implementation to reduce energy use and water use

2. Review and Demonstration of Service / Preventative Maintenance

- a. Explain location or delivery contact of the Operation and Maintenance manuals
- b. Review of manufacturer's recommended maintenance activities to maintain warranty
- c. Review and demonstrate frequent maintenance activities (air filter replacement, lubrication, fan belt inspection, and / or replacement, condenser water treatment, etc.), and suggested schedule
- d. Review and demonstrate typical servicing procedures and techniques (electrical current, pressure, and flow readings, etc.; calibration procedures, point trending, power fail restart procedures, etc.)
- e. Located, observe and identify major equipment, systems, accessories and controls
- f. Review emergency shut-offs and procedures

3. Review of the Information in the Systems Manual

- a. Describe use of Systems Manual
- b. Review elements of Systems Manual
- c. Explain how to update and add revisions to Systems Manual

4. Review Record Drawings on the Systems / Equipment

- a. Explain location or delivery contact of the record drawings
- b. Review record drawings, revisions, and changes to original design drawings
- c. Review equipment schedules and compare with actual installed systems

3.9 ACCEPTANCE PROCESS

- A. Process for Owner's Acceptance of Work:
 - 1. Fulfillment of prerequisites to Acceptance.
 - 2. Inspection for Acceptance.
 - 3. Issuance of Letter of Acceptance.

3.10 PARTIAL ACCEPTANCE OF WORK

- A. When partial utilization of Work is required and Acceptance of Work is a condition of such partial utilization, applicable requirements specified in this Section shall apply to parts of Work to be utilized.

3.11 PREREQUISITES TO ACCEPTANCE

- A. Following to be completed prior to requesting Owner's inspection for Acceptance.
- B. Perform Contractor Start-Up Activities.
 - 1. Submit evidence of compliance with regulatory requirements, including:
 - a. Occupancy permits.
 - b. Inspection / operating certificates.
 - 2. Remove from project site temporary facilities, tools, equipment, mock-ups and similar items.
 - 3. Complete starting of systems and equipment.
 - 4. Complete testing, adjusting and balancing of systems and equipment.
 - 5. Complete functional performance testing, including deficiency resolution.
 - 6. Complete final cleaning.
 - 7. Submit project record documents.
 - 8. Submit operation and maintenance materials.
 - 9. Submit training plans.
 - 10. Provide spare parts and maintenance materials.
 - 11. Submit product warranties and certificates of assurance.
 - 12. Make final changeover of locks and transmit keys to Owner.
 - 13. Ensure Work is ready for use for purpose intended.

3.12 INSPECTION FOR ACCEPTANCE

- A. Submit written request to Owner for inspection for Acceptance of Work, certifying prerequisites have been satisfied and indicating any exceptions to be completed, corrected or submitted.
- B. Owner shall, within a reasonable time after receipt of the inspection request, proceed with the inspection, or inform the Contractor of any prerequisites not completed.
- C. Results of Owner's inspection for Acceptance shall form an initial Contract deficiency list.

3.13 ACCEPTANCE OF WORK

- A. Following inspection, Owner shall:
 - 1. Issue a Letter of Acceptance stating effective date of Acceptance of Work, with a copy of Contract Deficiency list attached, or
 - 2. Advise Contractor that prerequisites to Acceptance are not fulfilled and repeat inspection for Acceptance after the prerequisites have been addressed.
- B. Upon Issuance of Letter of Acceptance, Owner shall assume responsibility for care, custody and control of Work, including responsibility for:
 - 1. Facility operation, including systems and equipment.
 - 2. Maintenance.
 - 3. Security.
 - 4. Property insurance.
 - 5. Utility costs.

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September 25, 2015

01 91 00-19

Fire Station No. 22
Commissioning

SECTION 02 41 00

DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Demolition necessary or required so that the new construction and related work can be performed and completed in accordance with the Contract Documents.
1. Debris (demolition materials) shall be salvaged, recycled or otherwise diverted from landfill. Debris which cannot be salvaged, recycled or used on-site for fill shall be removed from site and disposed of in a legal manner.
 2. Existing equipment and fixtures that are not specifically noted on Drawings will not be salvaged and these items shall become the property of the Contractor and removed from site.
 3. Concrete and brick from demolished existing buildings to be used for fill and paving aggregates or otherwise diverted from landfill.
- B. Related Sections:
1. Section 01 74 19 – Construction Waste Management and Disposal: Required record keeping and other LEED requirements.
 2. Section 31200 – Earthwork for Structures and Pavements

1.2 SUBMITTALS

- A. Submit the following in accordance with Section 01 33 00:
1. Copies of permits and notices authorizing building demolition as may be required by law, including permits to transport and dispose of debris.
 2. Shop Drawings: Drawings of temporary structural support locations and calculations sealed by a Structural Engineer registered in the State where the project is located.
 3. Demolition Plan: Submit detailed plan outlining specifics of techniques to be employed for demolition, protection of adjoining building and items which will not be able to be diverted from landfill.
 4. Insurance: Submit proof of insurance as required by SSP Section 7-3 in Volume 1.
 5. Submit documentation acceptable to LEED Project Administrator showing total weight(s) of concrete / brick diverted from landfill as required for LEED submittals.
- B. Submit project record documents which accurately record actual locations of capped utilities, and concealed obstructions in accordance with Section 01 7700.

1.3 QUALITY ASSURANCE

- A. Demolition Firm Qualifications:
1. Specializing in performing the Work required by this Section and as indicated on Demolition Drawings.
 2. Minimum 2 years documented experience.
 3. Utilizing workers experienced in disconnecting and capping utilities, if applicable.

- B. Regulatory Requirements
 - 1. Conform to applicable code(s) for demolition of structures, safety of adjacent structures, dust control, runoff control and disposal.
 - 2. Obtain required permits from authorities.
 - 3. Notify Resident Engineer immediately if hazardous or contaminated materials are discovered.

1.5 SEQUENCING AND COORDINATION

- A. Sequence activities to demolish the work in accordance with the Contractor's Project Schedule.
- B. Contractor shall coordinate full demolition requirements with improvement documents, including that demolition which may include public right of way, to accommodate all new improvements.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Carefully remove salvageable items such as light fixtures, grilles, doors, hardware, plumbing fixtures, and other items which are not specifically indicated for reuse, but which may have salvage value.
 - 1. Remove materials and equipment as noted on Demolition drawings that Owner will salvage prior to demolition.
 - 2. Materials and equipment which are not salvaged by the Owner shall become the possession of the Contractor and shall be immediately removed from the site in accordance with Construction Waste Management Plan as provided in Section 01 74 19.
- B. Carefully remove materials (in whole or in part as required) that are scheduled for reuse. Store and protect for reinstallation the materials.
 - 1. Concrete: Crushed and graded concrete may be used as aggregate, sub-base material, or fill.
 - 2. Asphalt Material: Sort by type. May be recycled for asphalt paving products or used as fill off site.
 - 4. Wood: Sort by type and size for salvage. Wood unsuitable for salvage shall be properly disposed of
 - 5. Metal: Salvage metals for recycling.
- C. Fill materials at excavations: As specified in Section 31200.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions and notify the Resident Engineer in writing of discrepancies before proceeding with the work.
- B. When unanticipated mechanical, electrical, or structural elements that conflict with the intended demolition are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Resident Engineer.

3.2 PREPARATION

- A. Notify affected utility companies before starting work and comply with their requirements.
 - 1. Mark location of utilities.
 - 2. Identify, disconnect, remove and cap designated utilities within demolition areas.
- B. Provide, erect, and maintain temporary barriers and security devices where required and as indicated on drawings.
- C. Protect bench marks and existing work from damage or displacement.
- D. Prevent movement or settlement of adjacent structures.
- E. Protection of existing building exterior. Erect barriers as indicated and as otherwise required to protect adjacent buildings and site amenities. Maintain exit requirements.
- F. Roofing Removal: During the removal of the existing parapets and roofing, provide proper protection from falling objects.

3.3 GENERAL DEMOLITION

- A. Carry out demolition work to cause as little inconvenience to any adjacent occupied building or site areas as possible and with minimum interference to public or private accesses. Maintain protected egress and access at all times.
- B. Shore existing construction as required to maintain safe working environment.
- C. Cease operations immediately if adjacent structures appear to be in danger. Notify authority having jurisdiction and Resident Engineer. Do not resume operations until directed by Resident Engineer.
- D. Provide hoses and water connections for sprinkling of debris as necessary to limit dust to lowest practicable level.
- E. Material Disposal: In accordance with Section 01 74 19 and as follows.
 - 1. Remove materials from site and dispose of in accordance with the Waste Management Plan.
 - 2. No materials are to be sold on, or adjacent to, the site.
 - 3. Burning of materials on site is not permitted.
 - 5. Remove from site, contaminated, vermin infested, or dangerous materials encountered and dispose of by safe means so as not to endanger health of workers and public.
 - 6. Debris from the demolition shall not be allowed to accumulate within the building or on the site.

END OF SECTION

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SECTION 03 05 05

FLY ASH

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Fly ash admixture for incorporation into concrete mixes specified in the following specification sections:
1. Section 03 30 00 - Cast-In Place Concrete.
 2. Section 04 05 15 - Mortar and Masonry Grout.
 3. Section 04 22 00 - Concrete Masonry Units.
 4. Section 32 51 40 – Portland Cement Paving
 5. Section 32 62 00 – Concrete Curbs

1.2 SUBMITTALS

- A. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 QUALITY ASSURANCE

- A. Qualifications: The specific personnel to be involved in the finishing of concrete slabs shall demonstrate prior experience with mixes containing this elevated level of fly ash.

PART 2 PRODUCTS

2.1 MATERIALS

- A. General
1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 2. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
- B. Coal Fly Ash and Raw or Calcined Natural Pozzolan
1. Sampled and tested in accordance with the current edition of ASTM C 311, Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete.
 2. Conform to the requirements of the current edition of ASTM C 618, Standard Specification of Coal Fly Ash and Raw and Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete, as follows:
 - a. Meet the requirements of ASTM C 618, Table 1 Chemical Requirements and Table 1A Supplementary Optional Chemical Requirements.

- b. Meet the requirements of ASTM C 618, Table 2 Physical Requirements and Table 2A Supplementary Optional Physical Requirements in the following areas:
 - 1) Effectiveness in Controlling Alkali-Silica Reaction.
 - 2) Effectiveness in Contributing to Sulfate Resistance, Procedure A.
 - 3) Uniformity Requirements when air-entraining concrete is specified:
- c. Air-entrained concrete is not recommended in locations at elevations below 3000 ft. above sea level.
- 3. Source Quality Control:
 - a. Fly ash shall come from sources with an established quality control program to demonstrate that the fly ash consistently conforms to ASTM C 618 specification and uniformity requirements. The quality history shall include a minimum of 40 test results representing a minimum of the previous 6 months production of fly ash.
 - b. Per the current edition of ACI 232, Use of Fly Ash in Concrete, section 5.6, the fly ash quality history shall be available that demonstrates at least monthly ASTM C 618 certification results from a Cement and Concrete Reference Laboratory (CCRL) accredited laboratory. A minimum of 20 reports representing at least 6 months of fly ash production is required.

2.2 MIXES

- A. Provide fly ash admixture for incorporation into concrete mixes as specified in the following specification sections:
 - 1. Section 03 30 00 - Cast-In Place Concrete.
 - 2. Section 04 05 15 - Mortar and Masonry Grout.
 - 3. Section 04 22 00 - Concrete Masonry Units.
 - 4. Section 32 51 40 - Portland Cement Paving
 - 5. Section 32 62 00 - Concrete Curbs
- B. Proportioning:
 - 1. Per ACI 232, Use of Fly Ash in Concrete, section 4.1, the most effective method for proper proportioning of concrete for a specific application is by use of a trial batch and testing program per ACI 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete. When necessary, a series of mixtures shall be prepared and tested to determine the proper proportions for the specific project requirements.
 - 2. Fly ash proportioning to be provided by mass of total cementitious material.
 - 3. Not more than 15% of cementitious materials with a replacement factor of 1:2 relative to cement replaced.
 - 4. Fly ash level may be increased beyond the allowable 15% to not more than 40% for footings and 25% for concrete slabs that will receive either a broom finish or epoxy coating, but in such cases ACI provisions for determining standard deviation using test results for similar mixes is disallowed.
 - a. For any mix in which fly ash content exceeds 15%, standard deviation shall be calculated using test results for the exact mix to be used on this Project.
 - b. Smooth/trowelled finishes should not have this level of fly ash due to finishing issues.
 - 5. Contractor shall note that fly ash will cause the curing to specified strengths to take additional time (40 to 50 days instead of 28). Verify implications with Resident Engineer and Structural Engineer regarding backfilling and retaining walls.

PART 3 EXECUTION

Not Used.

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SECTION 03 05 10
CONCRETE MOISTURE VAPOR REDUCTION ADMIXTURE(MVRA)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."

1.2 SUMMARY

- A. Section includes:
1. High Performance Concrete Moisture Vapor Reducing Admixture (MVRA) for all new concrete slabs, including slab-on-grade, elevated slabs, roof decks, stair treads and landings.
- B. Related Sections:
1. Division 03 Section "Cast-in-Place Concrete" for vapor retarder.
 2. Division 09 Flooring Sections for flooring materials installed over concrete slabs that contain integral moisture vapor reduction admixture and for preparation requirements.
 3. Division 09 Section "Water Vapor Emission Control System" for topical water vapor reduction system.

1.3 DEFINITIONS

- A. 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.

1.4 REFERENCES

- A. American Society for Testing and Materials International (ASTM)
1. ASTM D 5084: Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.
 2. ASTM E 1643: Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.
 3. ASTM E 1745: Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
 4. ASTM F 710: Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
 5. ASTM C 494/C 494M-08a: Standard Specification for Chemical Admixtures for Concrete Type S.

1.5 SUBMITTALS

- A. Product Data: Manufacturer's printed data.

- B. Product test reports performed by a qualified independent testing agency evidencing compliance of products with specified requirements of moisture vapor transmission based on comprehensive testing of current products.
- C. Manufacturer's certificate certifying admixture provided meets or exceeds specified requirements.
- D. Sample life of the concrete warranty.
- E. Sample adhesion guarantee.
- F. Sample moisture letter.
- G. MSDS.

1.6 QUALITY ASSURANCE

- A. **Manufacturer Qualifications:** A firm with not less than two (2) years' experience in the manufacture of the specified concrete moisture vapor reduction admixture, capable of providing test reports indicating compliance with specified performance requirements, and able to provide on-site technical representation should the need arise. Selected product must have certification of compliance with ASTM C494 /C494M testing protocols from an independent AASHTO approved laboratory.
- B. **Pre-installation Conference.**
 - 1. Verify all are familiar with MVRA project specific quality control procedures, review concrete mix designs and examine procedures for ensuring quality of concrete materials. Each entity directly concerned with MVRA dosed concrete must attend in person, conference call, or provide electronic review of documents, mix designs and procedures. Those required to participate or to review include but are not limited to:
 - a. Contractor.
 - b. Independent testing agency responsible for concrete design mixtures, sampling and testing.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete subcontractor
 - e. Moisture Vapor Reduction Admixture manufacturer.
- C. **Ready Mixed Concrete 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."
- D. **Moisture Vapor Reduction Admixture Collection Agent / Representative Qualifications**
 - 1. Personnel conducting field sampling on behalf of the MVRA manufacturer shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- E. **Slab Moisture Testing and Evaluation:** Personnel performing laboratory tests shall be certified in the conduct of ASTM D5084 under the supervision of a licensed geotechnical engineer. The determination as to whether the concrete

slab is prepared to receive flooring, coatings, roofing, etc. rests with the MVRA manufacturer.

- F. Source Limitations: Obtain each type of concrete moisture vapor reducing admixture from the same manufacturer.
- G. ACI Publications: For slabs to receive moisture sensitive coatings or material, comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 302.2R-06, "Guide for Concrete Slabs that Receive Moisture- Sensitive Flooring".

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver MVRA in manufacturer's original, undamaged containers.
- B. Store MVRA protected from exposure to harmful weather conditions and in a temperature controlled area above 36 degrees.
- C. Do not allow product to freeze. Should product freeze, immediately contact the MVRA manufacturer for further instructions.

1.8 WARRANTY

- A. Moisture Vapor Reduction Admixture (MVRA):
 - 1. MVRA must be installed according to, and in compliance with, the manufacturer's published data sheet to include, but not limited to:
 - a. Dosing instructions.
 - b. Onsite representation and sampling requirements.
 - c. Use of an ASTM E 1745 vapor retarder installed following ASTM E 1643 and ASTM F710 guidelines; elevated slabs to receive flooring do not require a vapor retarder
 - d. The design and specifications for roof deck assemblies, to include but not limited to, the use of air barriers and/or vapor retarders is the sole responsibility of the design professional and is excluded from this warranty as are any costs incurred due to roofing overburden.
 - 2. Manufacturer's Warranty: To include:
 - a. Term: Life of the concrete.
 - b. Repair and/or removal of failed flooring or roofing.
 - c. Placement of a topical moisture remediation system.
 - d. Replacement of flooring/roofing materials like original installed to include material and labor.
 - 3. Adhesion Warranty: MVRA Manufacturer shall provide an adhesion warranty to match the term of the adhesive and/or primer manufacturer's material defect warranty upon MVRA manufacturer's acceptance of field bond test.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design "Barrier One High Performance Moisture Vapor Reduction Admixture" manufactured by Barrier One, Inc.; 522 S. Hunt Club Blvd., #303, Apopka, Florida 32703; Contact Manufacturer's representative: P: 877.224.5850, F: 866.594.3490 or Email at: info@barrierone.com

2.2

- A. Subject to compliance with the requirements of this section, under provisions of Section 01 60 00, substitutions may be considered. Failure to provide a product that meets or exceeds the MVRA warranty requirements of Part I and the MVRA field quality control requirements of Part 3 will result in all subsequent testing and slab remediation costs being borne by the ready mix supplier.
- B. Contact Regional Manager with Barrier One, Inc., 522 So. Hunt Club Blvd., Apopka, Florida 32703. Phone: 877.224.5850 Fax: 866 594 3490. Email: info@barrierone.com

2.3 MATERIALS

- A. Concrete moisture vapor reduction admixture (MVRA) for all interior slab (on ground and elevated) and structural roof deck construction shall be a non-toxic, liquid admixture that is free of all volatile organic compounds (VOC). It shall be specifically designed to have a natural chemical reaction with pre-existing elements inside the concrete to eliminate the route of moisture vapor emission through the slab by restricting the integral capillary system. Chemical reaction shall form a permanent barrier (capillary break) that is integral to the concrete, insoluble, and irremovable.

- | | | |
|-----|---|---|
| 1. | Hydraulic conductivity: | Project specific maximum of 6.0 E-8 cm/s per ASTM D5084 |
| 2. | Toxicity: | None |
| 3. | Odor: | None |
| 4. | Flammability: | None |
| 5. | VOC levels: | zero |
| 6. | Solvent: | water |
| 7. | Freeze Temp: | 32 degrees Fahrenheit (0° C) (store above 36° (2.3° C)) |
| 8. | Acid resistance: | Excellent |
| 9. | Hazardous vapors: | None |
| 10. | Installation: | All concrete |
| 11. | Capillary break: | Calcium Silicate Hydrate |
| 12. | pH: | 11.3 |
| 13. | weight: | 10.3 lbs/gal (net) |
| 14. | Integral biocide to inhibit growth of mold and bacteria | |

2.4 RELATED MATERIALS

- A. Sheet Vapor Retarder: ASTM E 1745 compliant material, with a maximum permeance of 0.1 US Perms and a minimum thickness of 0.01". Include manufacturer's recommended adhesive or pressure-sensitive tape.
 - 1. Products: Subject to compliance with requirements, [available products

that may be incorporated into the Work may be manufactured by, but are not limited to, the following]:

- a. Insulation Solutions, Inc.
- b. Meadows, W. R., Inc.
- c. Raven Industries Inc.
- d. Reef Industries, Inc.

2. It is the responsibility of the vapor retarder manufacturer to show compliance with the most current version of ASTM E1745.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with the requirements of Division 03 Cast-in-Place Concrete, or other appropriate section, for concrete mixing, placing and curing.
- B. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643, ASTM F710, ACI 302.2R-06 and manufacturer's written instructions.
- C. Add MVRA in accordance with manufacturer's printed data sheet instructions: For mix designs ranging from 0.42 to 0.52 w/cm, dose at 14 ounces per 100 pounds (414ml/45kg) of total cementitious materials. Remove an equal amount of water from the mix. Add separately from other admixtures at the tail end of the load. Mix designs below 0.42 and above 0.52 may require adjustment and consultation with MVRA manufacturer is required prior to their use.
 1. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete with MVRA according to ASTM C 94/C 94M; furnish batch ticket information showing dosage of MVRA.
 2. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Add the MVRA to where it makes direct contact with the ready mix and then rotate drum of batch truck on high for at least seven minutes prior to discharge.
- D. Freshening onsite with held back mix water is acceptable so long as the practice is in accordance with published ACI guidelines and does not exceed the original water to cementitious material ratio or instructions of the structural engineer.
- E. Use of water reducing admixtures is recommended to achieve slumps greater than 4" (102mm).
- F. Use of other admixtures in the same batch as MVRA is acceptable so long as each admixture is added separately.
- G. The inclusion of a shrink reducing admixture (SRA) is not acceptable
- H. Cold-Weather Placement: Comply with ACI 306.1.
- I. Hot-Weather Placement: Comply with ACI 301.

3.2 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. Cure concrete slabs to receive moisture sensitive coatings according to ACI 302.2R-06, by one or a combination of the following methods:
1. 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 concrete containing MVRA for not less than 24 hours, longer if ambient conditions are hot, windy, and sunny or subject to periods of very low humidity. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 2. 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.
 3. Removal: After curing period has elapsed, mechanically remove curing compound prior to the installation of final flooring material in accordance with ASTM F-710.
 - a. Do not chemically remove.

3.3 FIELD QUALITY CONTROL

- A. Testing and Inspecting: The manufacturer of the moisture vapor reduction admixture will, at their expense, engage qualified agencies to obtain project specific sample cylinders and independent certified laboratories for subsequent testing per ASTM D5084 and preparation of test reports.
- B. Testing of Slabs Containing MVRA:
1. The moisture vapor reduction admixture (MVRA) manufacturer will perform all moisture testing in accordance with this specification and will issue project specific warranties and adhesion guarantees prior to installation of any slab finishes; no further field slab moisture nor pH testing shall be required.
 - a. Failure to provide a product that meets or exceeds these requirements will result in all subsequent testing and slab remediation costs being borne by the contractor.
 2. A representative or agent of the moisture vapor reduction admixture (MVRA) manufacturer must be present at the jobsite during placement of all MVRA treated concrete.
 - a. Do not proceed without this representative being present.
 - b. A minimum of one business day notification is required.
 3. Field testing technician shall, at the expense of the MVRA Manufacturer, procure at least one 4 inch (102 mm) cylinder from every day of placement of MVRA dosed concrete for the purpose of subsequent hydraulic conductivity/coefficient of permeability testing.
 4. All cylinders shall be independently lab tested in accordance with ASTM D 5084 at the expense of the MVRA manufacturer.
 5. Test results must conform to specified limits.

- a. Should any cylinder from any day of placement deliver results in excess of $6.0 \text{ E-}08 \text{ cm/sec}$, the concrete moisture vapor reduction admixture manufacturer shall procure, at their expense, a core (or cores) from that day of placement. This core (cores) shall be sent to an independent laboratory for hydraulic conductivity (coefficient or permeability) per ASTM D 5084.
 - b. Should any core deliver results in excess of $6.0 \text{ E-}08 \text{ cm/sec}$ per ASTM D 5084, the concrete moisture vapor reduction admixture manufacturer shall provide, at their expense, a topical moisture mitigation system for all areas not meeting the stated limit.
6. Proceeding with placement of concrete dosed with the MVRA without the required representation will result in the contractor bearing the cost to core and ship appropriate material for testing per ASTM D 5084.

3.4 REPAIRS

- A. Make repairs to slab in accordance with Division 03 Section "Cast-in-Place Concrete" and as recommended by concrete moisture vapor reduction admixture manufacturer.

END OF SECTION

SECTION 03 10 00
CONCRETE FORMING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Formwork for cast-in-place concrete, including, but not limited to:
 - 1. Shoring, Bracing and Anchorage, including openings for other Work
 - 2. Form Accessories
 - 3. Form Stripping.
- B. Work performed under this section shall also comply with the requirements of the Structural Notes on the structural drawings.

1.2 DESIGN REQUIREMENTS

- A. Design, engineer and construct formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension.

1.3 SUBMITTALS

- A. Shop Drawings: Submit Drawings showing dimensions, materials, bracing, tie-hole layouts for exposed tie holes, and arrangement of joints.
- B. Product Data: Provide data on accessory materials and installation requirements.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 347R - Guide to Formwork for Concrete.

1.5 QUALIFICATIONS

- A. Design formwork under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed at the place where the Project is located.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site to prevent deterioration and damage.
- B. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

1.7 COORDINATION

- A. Coordinate this Section with other Sections of Work which require attachment of components to formwork.
- B. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement, request instructions from Resident Engineer and/or Structural Engineer before proceeding.

PART 2 PRODUCTS

2.1 MATERIALS - GENERAL

- A. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
- B. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.

2.2 FORM MATERIALS

- A. Metal Formwork and Accessories: In accordance with ACI 301. Provide as large a face dimension as possible for each individual form. Metal formwork shall be provided for all concrete formwork unless "special" shapes and sizes are required.
- B. Wood Materials:
 - 1. Plywood: Douglas Fir species; APA grade-trademarked; BB Plyform, Class 1, Exterior Grade as per PS1.
 - 2. Lumber: Spruce, Pine or Fir species; construction grade; with grade stamp clearly visible.

2.3 FORMWORK ACCESSORIES

- A. Form Ties: Removable or snap-off type, free of defects that could leave holes larger than one inch in concrete surface.
- B. Form Release Agent: Colorless, which will not stain concrete, or impair natural bonding or color characteristics of coating intended for use on concrete
 - 1. General Requirements:
 - a. Vegetable-based, do not use petroleum-based agents. Paraffin and waxes shall not be used when a concrete finish is required.
 - b. 100 percent biodegradable, zero VOC.
 - 2. Acceptable Products and Manufacturers:
 - a. Enviroform as manufactured by Conspec® Marketing and Mfg. Co., Inc., Kansas City, KS (800) 348-7351, www.conspecmkt.com
 - b. Bio-Form as manufactured by Leahy-Wolf Company, Franklin Park, IL (888) 873-5327
 - c. Greenplus Form Release Agent ES as manufactured by M.J. Doud, Inc., Ennis, MT (888) 682-6040.
 - d. Soy Form Away as manufactured by Natural Soy, LLC, Watkins, IA (888) 655-0039, www.soysolv.com.
 - e. Bio-Guard as manufactured by Atlas Construction Supply, Inc., San Diego, CA 92111 (868) 277-2100. www.atlasform.com
 - f. Or equal.
- C. Flashing Reglets: Galvanized steel 22 gage thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- D. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Drawings.

3.2 EARTH FORMS

- A. Hand trim sides and bottom of earth forms. Remove loose soil in pour cavity prior to placing concrete.

3.3 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping.
- D. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval from Structural Engineer before framing openings in structural members which are not indicated on Drawings.
- F. Provide chamfer strips on external corners of beams and columns.

3.4 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with Manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive applied coverings which are effected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in or passing through concrete work.
- B. Locate and set in place items which will be cast directly into concrete.
- C. Coordinate Work of other Sections in forming and placing openings, slots, reglets, recesses, chases, sleeves, bolts, anchors, and other inserts.
- D. Install accessories in accordance with Manufacturer's instructions, straight, level and plumb. Ensure items are not disturbed during concrete placement.
- E. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

- F. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.6 FORM CLEANING

- A. Clean and remove foreign matter within forms as erection proceeds.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

3.7 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 301.

3.8 FIELD QUALITY CONTROL

- A. Inspect erected formwork, shoring, and bracing to ensure that Work is in accordance with formwork design, and that support, fastenings, wedges, ties and items are secure.
- B. Do not reuse wood formwork more than 3 times for concrete surfaces to be exposed to view. Do not patch formwork.

3.9 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads. Forms shall be removed in accordance with the requirements of the General Structural Notes.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.
- D. Forms for retaining walls shall not be removed or disturbed for at least 14 days from date of last pouring. It may be required that such forms be left in place longer than the above specified period. The length of time they shall remain in place will depend on the system of forming and shoring, and the length of time shall in accordance with the requirements of the General Structural Notes.
- E. Formwork for stem walls and other parts not supporting the weight of the concrete may be removed as soon as the concrete has hardened sufficiently to resist damage.
- F. Cure exposed concrete in accordance with Section 03 30 00 whenever the formwork is removed during the curing period.
- G. Construction Waste: In accordance with Section 01 74 19.

3.10 REMOVAL STRENGTH

- A. When formwork removal is based on the concrete reaching its specified 28 day strength the concrete shall be presumed to have strength when either of the following conditions has been met:
1. When test cylinders, field cured under the most unfavorable conditions prevailing for any portion of the concrete represented, have reached the required strength.
 2. When the concrete has been cured for the same length of time as the age, at test, of laboratory cured cylinders which reach the required strength. The length of time concrete has been cured in the field shall be determined by the cumulative number of days or fractions thereof, not necessarily consecutive, during which the temperature of the air in contact with the concrete is above 50 degrees F. and the concrete has been damp or thoroughly sealed from evaporation and loss of moisture.

END OF SECTION

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SECTION 03 20 00

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Concrete reinforcement as shown on the Drawings and as specified.
- B. Work performed under this section shall also comply with the requirements of the Structural Notes on the structural drawings.

1.2 QUALITY ASSURANCE

- A. Comply with ACI-301, Chapter 5, except where more exacting requirements are specified.
- B. Comply with requirements in AWS-D12.1, except where more exacting requirements are specified in the Contract Documents.

1.3 SUBMITTALS

- A. Shop Drawings: Submit Drawings showing bending and placing of reinforcing. Include diagrammatic elevations of walls at a scale sufficiently large to show clearly the position and erection marks of marginal bars and their dowels and splices and bar arrangement for more than one layer of reinforcing steel in concrete sections.
- B. Certificates: Submit certified mill test reports for review prior to fabrication.
- C. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Shipping: Deliver reinforcement to the Project site bundled, tagged and marked to facilitate sorting and placing. Tags shall indicate bar sizes, lengths, grade and other information corresponding to markings shown on placement diagrams.
- B. Storage and Protection: Store reinforcement at the site off the ground and in a manner to prevent damage to the materials.

PART 2 PRODUCTS

2.1 MATERIALS

- A. General
 - 1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 - 2. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.

- B. Reinforcing Steel: In accordance with Cast-in-Place Concrete Notes on the structural drawings.
- C. Welded Wire Fabric: In accordance with structural drawings.
- D. Chairs: Galvanized steel or plastic tipped.
- E. Tie Wire: ASTM A82, 16 gauge or heavier, black annealed.
- F. Welding Rods: E-70 Series for A615 Grade 40 (ASTM A615M, Grade 300) reinforcing, and E-90 Series for A706 reinforcing; low hydrogen conforming to AWS A-5.1.

2.2 FABRICATION

- A. Shop fabricate bars as far as is practical. Bend bars cold. Make bends for stirrups and ties around pins having diameters at least 2 times the thickness of the bars; for other bars 1 inch diameter and smaller, 6 times the thickness; for larger bars 8 times the thickness.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Determine weldability of reinforcing steel by laboratory chemical analysis of steel. Only steel conforming to chemical requirements specified in AWS D12.1 may be welded.

3.2 PLACING REINFORCEMENT

- A. General:
 1. Place in accordance with ACI 318 and as shown on Structural Drawings.
 2. Accurately place reinforcement and securely tie at intersections with 16 gauge black annealed wire.
 3. Maintain reinforcing in proper position by chairs, bar supports or other approved devices.
 4. Bars in footings shall be supported on precast concrete blocks.
 5. The bending or field cutting of bars around openings or sleeves will not be permitted.
- B. Bars shall lap in accordance with requirements indicated on the structural drawings.
- C. Concrete protection of reinforcing shall be in accordance with Cast-in-Place Concrete Notes on the structural drawings.
- D. Clear distance between bars shall be not less than 1-1/2 times the maximum size of coarse aggregate unless noted otherwise.
- E. Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits or embedded items. If bars are moved more than one bar diameter or enough to exceed code tolerances, resulting arrangement of bars shall be subject to review of Resident Engineer.
- F. Bars with kinks or bends not indicated shall not be used. Reinforcement shall not be bent or be straightened in a manner that will weaken the material, or be bent after being partially embedded in hardened concrete.

- G. Wire mesh in slabs:
 - 1. Lap welded wire fabric at least 1-1/2 meshes plus end extension of wires but not less than 12 inches in structural slabs.
 - 2. Lap fabric at least 1/2 mesh plus end extension of wires but not less than 6 inches in slabs on ground.
 - 3. Extend mesh across supporting beams and walls.

3.3 CLEANING

- A. During the course of the Work and on completion, remove excess materials, equipment and debris and dispose of off premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

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SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Cast-in-place concrete including, but not limited to, the following:
 - 1. Building foundations and slabs on grade.
 - 2. Lightweight concrete floor topping over metal deck at 2nd and 3rd floor and roof
 - 3. Concrete fill for metal pan steel stairs as specified in Section 05 51 00.
 - 4. Site structures including, but not limited to, site lighting supports, electrical and mechanical equipment support pads, and other site furnishing and equipment requiring cast-in-place concrete items.

- B. Related Sections:
 - 1. Section 03 10 00 – Concrete Formwork
 - 2. Section 03 20 00 – Concrete Reinforcement
 - 3. Section 07 26 53 – Vapor Reduction Floor Coatings
 - 4. Section 32 51 40 – Portland Cement Paving
 - 5. Section 32 62 00 – Concrete Curbs

1.2 SYSTEM DESCRIPTION

- A. Performance Requirements: Interior slabs on grade scheduled to receive applied floor finishes (VCT, carpet, etc.) shall be tested as specified herein under Field Quality Control Calcium chloride test requirements. Moisture vapor from the floor must be less than 3 pounds per 1,000 square feet per 24 hours. Floor slabs that exceed this requirement shall be treated with a Vapor Reduction Floor Coating as specified in Section 07 26 53 as required to provide a satisfactory substrate for applied floor finish at no additional cost to Owner.

1.3 SUBMITTALS

- A. Mix Design: Submit mix design for each class of concrete to the Structural Engineer for review. Review of mix designs by Structural Engineer shall in no way relieve the Contractor of responsibility for the performance of the concrete.

- B. Product Data: Submit Manufacturer's Specifications and performance data for accessory products.

- C. Shop Drawings: Submit shop drawing showing proposed location of construction joints, expansion/contraction joints and control joints and obtain approval of same from Resident Engineer prior to construction.

- D. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.4 QUALITY ASSURANCE

- A. Standards:
 - 1. Standard for measuring, mixing, transporting and placing of concrete shall be ACI-301 and ACI-304.
 - 2. Standard for measuring, mixing and delivery of ready mixed shall be ASTM C94, except that time in mixer after water has been added at batch plant is limited to 1-1/2 hours.
 - 3. Job-mixed concrete shall be subject to Structural Engineer's review of design, mixing and handling procedures.
- B. Field Samples:
 - 1. Provide on-site sample(s) of each type of exposed flatwork concrete finishes (hard trowel, broom finish, sandblast, etc.) including tooling showing texture and color before proceeding with finish to be used on this Project.
 - 2. Sample(s) shall be minimum 4'-0" square and have at least one longitudinal and one transverse joint.
 - 3. Construct sample panels in ample time to allow for finishing and curing before requesting Resident Engineer to review.
 - 4. Construct where directed by Resident Engineer and prepare successive sample panels as required until finish acceptable to Resident Engineer is produced.
 - 5. Since sample panels will constitute a basis of acceptance or rejection of the completed Work, do not remove sample panels until authorized in writing by the Resident Engineer. Dispose of sample panels in a legal manner when authorized.

1.5 PROJECT CONDITIONS

- A. Rain protection: Do not place concrete during rain unless adequate protection has been provided.
- B. Cold weather protection: Comply with ACI-306R.
- C. Hot weather protection: Comply with ACI-305R.

PART 2 PRODUCTS

2.1 MATERIALS

- A. General
 - 1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 - 2. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
- B. Portland Cement: ASTM C150, Type II, provide type V at locations in contact with soil, alkali content not to exceed 0.6 percent. Use one brand and type of cement throughout Project unless otherwise specified.
- C. Aggregate: In accordance with Cast-in-Place Concrete Notes on the structural drawings and as follows.
 - 1. Structural Concrete: Clean, coarse aggregate and gravel, free from foreign matter, conforming to ASTM C33. Aggregate shall be graded from coarse to fine in accordance with ASTM C33, Size 67. See also Structural Notes.

- D. Admixtures:
1. Air entraining admixture: ASTM C260.
 2. Use of calcium chloride is not permitted.
 3. Fly ash admixture: In accordance with Section 03 05 05.
 4. Use set-retarding admixtures during hot weather only when approved by Resident Engineer.

E. Water: Potable.

2.2 ACCESSORIES

A. Bonding Agent:

1. Interior Only (PVA): L&M Construction Chemicals EVERWELD www.lmcc.com, US Spec "Bondcoat" www.usspec.com, or Larsens' Weld Crete www.larsenproducts.com
2. Interior Only for Bonding Existing Concrete to Fresh Concrete (Epoxy): Sika Sikadur 32, Hi-Mod www.sikausa.com, US spec Maxi-Bond 2500 www.usspec.com, or W.R. Meadows Rezi-Weld www.wrmeadows.com.
3. Exterior and Interior (acrylic latex): Euclid Eucobond www.euclidchemical.com, W.R. Meadows Intralok www.wrmeadows.com, US Spec Acylcoat www.usspec.com, or Dayton Bond J40 www.daytonsuperiorchemical.com.

B. Non-Shrink Grout:

1. Premixed or prepackaged, non-metallic, non-gaseous, bleed free compound; non-shrink when tested in accordance with ASTM C 1107, Grade B at a fluid (flow cone) consistency of 20 to 30 seconds.
2. Attain minimum compressive strength of 7,000 psi in 28 days at above fluid consistency.
3. Fluid grouts: Remain workable, flow through flow cone after 20 minutes with slight agitation, in temperatures from 40 to 90 degrees F.
4. Acceptable manufacturer and products: Dayton Superior (Suregrip High Performance) www.daytonsuperiorchemical.com, Sika (Sikagrout 212) www.sikausa.com, Master Builders (Masterflow 713) www.masterbuilders.com, W.R. Meadows No. 588 Grout www.wrmeadows.com, L&M Construction Chemicals (DURAGROUT) www.lmcc.com, US Spec "MP Grout" www.usspec.com, and Euclid N-S Grout www.euclidchemical.com or equal.

C. Formed Construction Joint: Standard design plastikey, tongue and groove key joint; 3-1/2 inch vertical dimension for 4 inch slabs.

D. Preformed Expansion Joint Filler: ASTM D1751.

E. Liquid Curing Compound: Provide acrylic resin or dissipating hydrocarbon resin type as applicable to final floor finish as recommended by curing compound manufacturer.

1. Acrylic Resin Type:
 - a. VOC compliant, ASTM C309, Type 1, Class B; acrylic type.
 - b. W. R. Meadows Sealtight VOCOMP-20, L&M Construction Chemicals Dress & Seal WB, US Spec Hydrasheen 15%, or Dayton Superior J-18 or equal are acceptable products.

2. Dissipating Hydrocarbon Resin Type: US Spec Maxcure Resin Clear HS, water-based, high solid, dissipating resin curing compound or equal.
 3. Verify that specified curing compound is compatible with the floor finish material(s) and adhesive(s) that will be applied to floor surface prior to delivery of curing compound to jobsite. If it is determined that the curing compound is not compatible with the floor finish material(s) and adhesive(s) that will be applied to floor surface, Contractor shall immediately notify Resident Engineer.
- F. Sealer: VOC compliant, acrylic copolymer type.
1. Interior: ASTM C1315, Class B. Provide one of the following: W. R. Meadows VOCOMP-30, Euclid Super Aqua Cure VOX, L&M Construction Chemicals Dress & Seal WB #30 or Dayton Superior J-19 or equal are acceptable products.
 2. Exterior: ASTM C1315, Class A. Provide one of the following: Euclid Super Diamond Clear VOX, L&M Construction Chemicals Lumiseal WB, W. R. Meadows VOCOMP-30 or US Spec "Radiance UV-25" Class A or equal are acceptable products.
- G. Leveling Agent: Sonneborn Sonoflow, Euclid Flo-Top, Ardex K-15, L&M Construction Chemicals Levelex, US Spec "Self-Leveling Underlayment, or Dayton-Superior Levelayer 1 or equal are acceptable products.
- H. Vapor Barrier Membrane: Conform to the following requirements.
1. Manufactured from prime virgin resins.
 2. Strength (ASTM E-1745): Meets or exceeds Class A.
 3. Permeance Rating: Maintain permeance of less than 0.01 perms (gr/ft²/hr/in-Hg) as tested in accordance with conditioning tests per ASTM E 154 Sections 7.1.1-7.1.5.
 4. Minimum thickness (ACI 302.2R-06): 15 mils.
 5. Basis of Design: Stego Wrap 15- mil Vapor Barrier by Stego Industries LLC
 6. Acceptable alternatives:
 - a. W.R. Meadows Premoulded Membrane with Plasmatic Core.
 - b. VaporGuard by Reef Industries, Inc.
 - c. Or equal.
 7. Accessories
 - a. Seam Tape:
 - 1) High Density Polyethylene Tape with pressure sensitive adhesive.
 - 2) Water Vapor Transition Rate (ASTM E96): 0.3 perms or lower.
 - 3) Minimum width 4 inches.
 - 4) Acceptable product: Stego Tape by Stego Industries LLC or equal.
 - b. Vapor Proofing Mastic
 - 1) Water Vapor Transmission Rate (ASTM E 96): 0.3 perms or lower
 - 2) Acceptable product: Stego Mastic by Stego Industries LLC or equal.
 - c. Pipe Boots: Construct pipe boots from vapor barrier material and pressure sensitive tape per manufacturer's instructions.
- I. Concrete Accessories: Gateway Engineering Company, Dayton-Superior Corporation, or Burke Concrete Accessories or equal.

- J. Evaporation Retarder:
 - 1. Type: Monomolecular film, compatible with subsequent coatings and floor finishes.
 - 2. Acceptable Manufacturer and Products: L&M Construction Chemicals (E-Con), Master Builders (Confilm), Sika (Sika Film), W.R. Meadows (Evapre), US Spec (Monofilm ER), or Dayton Superior (Surefilm J-74). U.S. Spec "Top-Etch" or equal.

2.3 MIXES

- A. Design of Mixes: ACI 301 and ACI 304, except as otherwise specified.
- B. Selection of proportions for normal weight concrete: ACI 301.
- C. Mix and deliver ready-mixed concrete in accordance with requirements of ASTM C94, Option A.
 - 1. Not more than 90 minutes shall elapse from time water is introduced into the concrete mixture until completion of placement.
 - 2. Do not add water to mix that has stiffened to increase its workability.
 - 3. At no time shall concrete mix exceed a bulb thermometer reading of 90 degrees F. or over.
 - 4. Use ice or other method as reviewed by Resident Engineer, to keep concrete below 90 degrees F. temperature. Ice shall be measured by weight and not be volume.
- D. Water-cement ratio: In accordance with Cast-in-Place Concrete Notes on the structural drawings and as follows
 - 1. Concrete used for interior slab on grade construction: 0.40 to 0.45.
- E. Use of water reducing admixture, if needed, shall be submitted for approval. Proportion water reducing admixture in accordance with Manufacturer's recommendations. Delivery tickets shall state the amount and kind of admixture.
- F. Air Entraining Admixture: All concrete exposed to freezing and thawing and/or required to be watertight shall have an air content of 4.5 to 7.5 percent in accordance with ACI 212.3R. All interior, slabs subject to vehicular abrasion, shall have a maximum air content of 3 percent.
 - 1. Limit air content for lightweight concrete to 4-6 percent.
- G. Compressive strength (28 day): In accordance with Reinforced Concrete Notes on the structural drawings.
- H. Slump: In accordance with Cast-in-Place Concrete Notes on the structural drawings.
- I. Concrete: Per structural drawings.
 - 1. Foundations.
 - 2. Slab on Grade.
 - 3. Slab on Grade Apparatus.
 - 4. Walls.
 - 5. Concrete on Metal Decks.

PART 3 EXECUTION

3.1 PREPARATION

- A. Prior to placing concrete:
 - 1. Clean equipment involved.
 - 2. Remove debris and foreign material from the forms.
 - 3. Remove concrete laitance from reinforcing steel.
 - 4. Wet wood forms and masonry units in contact with concrete.
- B. No wood other than built-in bucks or nailing blocks will be permitted to remain permanently inside the forms.
- C. Coordinate the necessary Trades as required to provide the sleeves, bolts, anchors, holes, etc., to be built in.
- D. Vapor Barrier: Place vapor barrier over subbase immediately prior to placing of floor slab. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643. Vapor barrier shall be continuous over entire floor area and turned up a minimum of 2 inches and sealed to perimeter walls and penetrations. Tears, punctures and penetrations shall be taped to maintain the moisture vapor resistance integrity of vapor barrier.
 - 1. Ensure that subsoil is approved by Resident Engineer. Level and tamp or roll aggregate, sand or tamped earth base.
 - 2. Unroll Vapor Barrier with the longest dimension parallel with the direction of the pour. Lap Vapor Barrier over footings and seal to foundation walls.
 - 3. Overlap joints 6 inches and seal with manufacturer's tape.
 - 4. Seal all penetrations (including pipes) with manufacturer's pipe boot.
 - 5. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.
 - 6. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all four sides with tape.

3.2 PLACING OF CONCRETE

- A. Concrete Work shall be performed in accordance with ACI-301 except as amended by this Section.
- B. Convey concrete from the mixer to place of final deposit by methods which will prevent segregation of aggregate or loss of material. Place concrete at such a rate that concrete is at all times plastic and to insure a practically continuous flow of concrete. Concrete not in place 1-1/2 hours after water has been added at batch plant may be rejected by Resident Engineer.
- C. Place concrete as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Do not deposit concrete that has partially hardened or been retempered.
- D. Do not place concrete during rain unless adequate protection has been provided.
- E. Thoroughly compact concrete by suitable means during the placing, and work around the reinforcement and embedded items into the corners of the forms.
 - 1. Use vibrators to aid in the placement of the concrete, operated by experienced personnel.
 - 2. Keep at least one spare operating vibrator on the job at all times during the concrete operations.

3.3 CONSTRUCTION JOINTS, EXPANSION/CONTRACTION JOINTS AND CONTROL JOINTS

- A. Construction Joints: Provide as required to facilitate construction in accordance with reviewed shop drawings.
- B. Expansion/Contraction and Control Joints: Place expansion/contraction joints and control joints where required to ensure that undesirable thermal and shrinkage cracking of slabs is minimized.
 - 1. See Drawings for locations of expansion/contraction joints and control joints in slabs-on-grade and in topping pours.
 - 2. If drawings do not indicate locations, verify with Structural Engineer prior to placement of slabs-on-grade and topping pours.
 - 3. At exterior slabs-on-grade provide a 1/2 inch wide expansion/contraction joint wherever slabs abut vertical construction elements whether indicated or not.
- C. Additional reinforcing may be required at some construction, expansion/contraction and control joints, and shall be supplied and installed at no additional cost.
- D. Reinforcing shall be continuous through construction joints. No concrete pour shall be longer than 100 feet or more than 4,000 square feet in area. Provide shear keys as detailed.
- E. Provide support of formed construction joint materials by means that does not puncture or otherwise damage under floor vapor retarder at interior floor slabs on grade.

3.4 FINISHING VERTICAL (FORMED) SURFACES

- A. Formed surface finishes:
 - 1. Pits, tunnels, mechanical rooms and concealed surfaces: Remove fins, patch tie holes.
 - 2. Interior exposed surfaces and exterior exposed surfaces: Remove fins, patch tie holes, stone joint marks and out-of-plane surfaces to within 1/16 inch of flush, to produce uniformity, dense and smooth concrete.

3.5 FINISHING HORIZONTAL SURFACES

- A. Rake concrete into place, screed and compact with a light tamp, except do not tamp topping and slabs not on grade. Screed with sawing motion and float surface to bring fines to the top.
- B. Mix and apply evaporation retarder in accordance with manufacturer's printed instructions immediately after floating. In extreme drying conditions, apply additional material as needed. Apply lightly on hard to trowel floor areas.
- C. When concrete has hardened sufficiently so that excess fines will not be brought to the surface, trowel slab with a steel trowel to a smooth surface free of pinholes and other imperfections. A mechanical trowel with rotating steel blades, approved by Resident Engineer, may be used for this operation.
- D. After the surface has hardened sufficiently to ring under a trowel, trowel again with a steel trowel to a hard, burnished surface free of blemishes. A mechanical rotating trowel will not be permitted for this operation.

- E. Use a small radius edger on edges of exposed Work. Use a deep cutting, scoring tool or sawcutting to provide scoring for control joints as indicated unless otherwise noted or directed.
- G. Exterior flatwork to receive medium broom finish unless otherwise indicated on the Drawings.
- H. Finish floors shall meet requirements of ACI 302.1R for a Flat (3/16 in 10'-0") Classification. Floors scheduled to receive thin-set tile applications shall meet Very Flat (1/8 inch in 10'-0") Classification.

3.6 SLABS

- A. Saw cut or score control joint pattern indicated on Drawings. Use 3/16 inch thick blade or scoring tool, cutting 1/4 of depth of slab thickness.
- B. Slope to drains 1/4 inch per foot nominal across entire room or area to be drained.
- C. Exposed floor slabs to be hard troweled and sealed where left exposed in the finish work.

3.7 APPARATUS BAY FLOOR

- A. The apparatus floor shall be poured in keyed sections using greased rods to connect each section.
- B. Sections shall be poured in a manner to slope to floor drains at each bay.
- C. Where concrete comes in contact with side walls, front and rear driveways, and any other surface, the floor shall be fitted with zip cap felt and caulking.
- D. The finished concrete shall be cleaned and sealed in the final phase of finish construction.
- E. Protection: Protect apparatus bay concrete slabs from damage, by covering with a one inch layer of clear, dry sand. Provide planking whenever scaffolding or wheeled equipment may be required to be erected over slabs. Damage to slabs prior to acceptance of the Work will be cause for rejection of slabs and replacement will be required.

3.8 REPAIR OF SURFACE DEFECTS

- A. Modify or replace concrete not conforming to required lines, detail and elevations.
- B. Repair or replace concrete not properly placed, resulting in excessive honeycombing and other defects. Do not patch, repair or replace exposed architectural concrete except upon express direction of Resident Engineer.
- C. After forms are removed, fill tie rod holes, correct honeycomb spots, remove fins and clean and finish damaged surfaces. Wipe off excess mortar and rub to match adjoining surfaces.

- D. When excessive honeycombing is revealed, remove the defective material immediately after stripping forms to a depth of 3/4 inch to 1 inch. Cut edge of area perpendicular to surface to avoid feathered edges. Saturate with water for several inches beyond cutout and brush-in a grout consisting of equal parts Portland cement and sand. Follow immediately with the patching mortar. Leave the patch slightly higher than the surrounding surface. After an hour or two, finish flush with the adjoining surface. Wipe and rub patch to match adjoining surfaces. Keep patches moist for 7 days.
- E. Patching mortar shall consist of the same materials and proportions as the original concrete except that the coarse aggregate shall be omitted. When color match is required, adjust mixture to produce a finished color to match the adjoining concrete surfaces.
- F. Cracks caused by expansion, shrinkage and the like that occur in natural color concrete up through final acceptance of building shall be carefully patched with floorstone, epoxy grouting mortar or other method acceptable to the Resident Engineer.

3.9 CURING

- A. Work performed under this section shall also comply with the requirements of the Concrete Curing within Structural Notes on the structural drawings.
- B. Protect freshly deposited concrete from premature drying and maintain without drying at a relatively constant temperature for the period of time necessary for the hydration of the cement and proper hardening of the concrete.
- C. Curing Methods: Cure concrete surfaces receiving finish materials, including, but not limited to; cementitious toppings, paint, and flooring, using one of the following two methods immediately after finishing operations. Consideration shall be given to the construction schedule impact and the compatibility of finish materials with the concrete when selecting a method.
 - 1. Keep concrete continuously moist for at least 7 days using polyethylene film or other acceptable covering. Interior floor slabs on grade shall be continuously moist cured for a minimum of 7 days in accordance with ACI standards, liquid curing compounds shall not be acceptable.
 - 2. Apply liquid curing compound in accordance with the manufacturer's instructions. Remove curing compound before finish materials are applied unless it has been demonstrated that the curing compound can satisfactorily serve as a base for finish materials. Method of removal shall result in a satisfactory base for finish materials.
- D. Prevent rapid drying of the concrete at the end of the curing period.
- E. During the curing period, protect the concrete from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibrations. Protect finished concrete surfaces from damage caused by construction equipment, materials or methods.

3.10 LEVELING AGENT

- A. Apply leveling agent to correct unsatisfactory floor surface due to undue settlement, shrinkage or cracking.
- B. Apply material when, in the opinion of Resident Engineer, it is necessary to provide an acceptable surface.

- C. Application to be in accordance with Manufacturer's directions.

3.11 FLOOR SEALER

- A. At areas indicated on Drawings, provide 2 coats of sealer (CONC-1).
- B. Surface must be clean, dry and free of loose dirt, oil, wax, curing and parting compounds and other foreign matter.
- C. Apply each coat in accordance with Manufacturer's printed instructions.

3.12 FIELD QUALITY CONTROL

- A. Tests: Inspection and testing of concrete mix will be performed by a testing laboratory in accordance with Section 01 45 00.
 - 1. Provide free access to Work and cooperate with appointed firm.
 - 2. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.
 - 3. Four concrete test cylinders shall be taken for every 100 or less cubic yards of concrete placed. One cylinder shall be tested after 7 days for information. Test two cylinders after 28 days. Hold one cylinder for additional information, as required.
 - 4. Take one additional test cylinder during cold weather concreting, and cure on job site under same conditions as concrete it represents.
 - 5. Take one slump test for each set of test cylinders taken.
 - 6. Concrete which does not meet the compressive strength requirement at 28 days will be rejected and removed from the Project, and disposed of in a legal manner.
- B. Calcium chloride test requirements:
 - 1. Two weeks before installation of the ceramic tile, VCT, vinyl, wood, carpet, epoxy flooring and/or other finish flooring systems over the interior concrete slabs, provide calcium chloride test to determine the level of water vapor transmission in the slab.
 - 2. Conduct testing in accordance with ASTM F1869 or ASTM E1907 (quantitative anhydrous calcium chloride test).
 - 3. Conduct calcium chloride tests after HVAC system has been in continuous use for 36 hours with a minimum ambient temperature of 72 degrees F. Water vapor transmission levels are directly affected by ambient room temperature and readings conducted without a sustained ambient temperature is NOT acceptable.
 - 4. Document test results and provide copy to Resident Engineer with a marked up floor finish plan showing test results.
 - 5. Provide a written clarification on status of HVAC system before and during the test and the length of time the ambient air temperature was maintained before the tests.

3.13 PROTECTION

- A. Protect finished surfaces from stains or abrasions. Protect surfaces or edges by leaving forms in place or by providing temporary covers. Protect concrete from rain, flowing water or mechanical injury.

- B. Protect floor slabs from the droppings of plaster, paint, dirt, and other marring by covering with polyethylene plastic sheet, or other acceptable floor protection covering, well lapped and sealed.
 - 1. Method used to hold plastic sheets and coverings in place where slabs comprise the finished surface shall not leave permanent discoloration. Duct tape (and other similar adhesive tapes) shall not be used to hold coverings in place on floor slabs that will remain exposed in the final work.
 - 2. Where concrete slabs are scheduled to be the finished floor surface, or where slab is treated with a special concrete finish serving as the finished floor surface, provide a continuous covering of 1/2 inch particle board, joints tightly butted and cut to sizes tight to wall construction, over entire floor area over polyethylene plastic sheet, or other acceptable floor protection sheeting.
 - a. Particle board (wood and agrifiber products) must contain no added urea-formaldehyde resins in accordance with the requirements of "Low Emitting Materials" as specified in Section 01 60 00 - Materials and Equipment.
 - b. Maintain covering (polyethylene and particleboard) in good condition until danger of damage is past.

3.14 CLEANING

- A. During the course of the Work and on completion of the Work, remove and dispose of excess materials, equipment and debris away from premises.
- B. Construction Waste: In accordance with Section 01 74 19.
- C. Storm Water Control: In accordance with Greenbook/Whitebook requirements, Section 7-8.6.
- D. Environment Protection: In accordance with Greenbook/Whitebook requirements, Section 7-8.6.

END OF SECTION

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SECTION 04 01 20.52

MASONRY CLEANING

PART 1 GENERAL

1.1 SYSTEM DESCRIPTION

- A. Performance Requirements: The application of chemical cleaner shall leave the finished surfaces uniform in color and shall not alter the natural texture of the masonry units.

1.2 SUBMITTALS

- A. Submit samples and manufacturer's instructions for masonry cleaning chemicals for approval prior to delivering materials to the site or commencing the work in this Section.
 - 1. Cleaning compound manufacturer shall procure and apply cleaning solutions to samples of the masonry units to be used in the structure which will be reviewed by the Resident Engineer for both aesthetics and effectiveness.
 - 2. Cleaning compound manufacturer's instructions: Submit current method of application for cleaning chemicals stating the actual application rates.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Engaged in producing materials with a satisfactory performance record for at least 2 years.
 - 2. Applicator: Trained, approved and accepted by the cleaning compound manufacturer. Application personnel shall have at least 2 years experience with the particular materials being applied.
- B. Field Samples:
 - 1. A test area of wall surface from 10 to 20 square feet in size shall be cleaned with the chemical cleaner recommended by the cleaning compound manufacturer for acceptance by the Resident Engineer.
 - 2. Test samples of adjacent non-masonry materials for possible reaction with the diluted cleaning materials. Samples to be available for review by the Resident Engineer.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Delivery shall be made to the job site in manufacturer's original containers with seals unbroken and labeled with manufacturer's batch number.
- B. Storage and Protection:
 - 1. Store materials in original, unopened containers in compliance with manufacturer's printed instructions.
 - 2. Do not store in areas where temperature will fall below 20 degrees F. or rise above 100 degrees F.

1.5 PROJECT/SITE CONDITIONS

- A. Physical Requirements for Proper Installation or Application: Temperature and relative humidity conditions for a period before, during and after application shall be as recommended by the manufacturer.

PART 2 PRODUCTS

2.1 MATERIALS

A. Chemical Cleaner:

1. Cleaner shall be a solution of blended liquid acids, heavily inhibited and emulsified and in combination with special wetting systems.
2. Specific product selection shall be dependent upon substrate as recommended by the chemical cleaner manufacturer.
3. Cleaner shall be acceptable to the masonry unit manufacturer.
4. Muriatic acid shall not be acceptable as a chemical cleaner for new masonry.
5. Acceptable Manufacturers and Products:
 - a. Sure-Klean Vana Trol and Sure-Klean No. 600 Detergent as manufactured by ProSoCo, Inc., www.prosoco.com
 - b. 202V Vana-Stop and 202 New Masonry Detergent as manufactured by Diedrich Technologies www.diedrichtechnologies.com are acceptable products.
 - c. Or equal.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Prior to start of work, carefully inspect the installed work of other trades, and verify that such work is complete to the point where this work may commence.
2. The chemical cleaner manufacturer's representative shall verify that the chemical cleaner may be applied in accordance with the manufacturer's recommended methods.
3. In the event of discrepancy, immediately notify the Resident Engineer.
4. Commencement of system application constitutes acceptance of surfaces by applicator.

3.2 PREPARATION

A. Protection:

1. Use all means necessary to protect the installed work of other trades.
2. Concrete sidewalks shall be protected from runoff by soaking with water immediately prior to application on adjacent walls.
3. Adjoining glass, metal and painted surfaces shall be protected from overspray and splash of chemical cleaner. Inadvertent splashes shall be removed in an approved manner before the solution has damaged the surface.
4. In the event of damage, immediately make all repairs and replacements necessary to the approval of Resident Engineer and at no additional cost to Owner.

B. Surface Preparation for Chemical Cleaner:

1. In strict accordance with manufacturer's printed instructions.
 - a. Masonry walls shall be cleaned within 14 to 28 days after installation.
 - b. Walls shall be free of excess mortar.
 - c. Cracks, other than hairline cracks, shall be pointed up.
 - d. Defective mortar joints shall be routed out, pointed with mortar and tooled.

2. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

C. Presoaking Hoses:

1. Adequate water supply shall be made available to assure thorough pre-soaking and thorough rinsing of the wall before undertaking general cleaning.
2. Two water hoses shall be used by the cleaning crew.
3. One hose shall be attached to a length of lawn soaker hose placed along the top of the wall to provide a uniform and complete saturation of the entire wall area.
4. The second hose shall provide a copious flow of water for thorough flushing of excess mortar and dirt from the scrubbed areas.
5. The lawn soaker hose is later to be placed at the face of the scaffold or stage to provide a continuous spray of wall areas below the working area.

3.3 APPLICATION

A. Chemical Cleaner: Application to be in strict accordance with manufacturer's printed instructions and as follows:

1. Surfaces shall be thoroughly pre-soaked with clean water to prevent the absorption of the cleaning solution within the pores of the masonry.
2. Cleaning solution shall be diluted with clear water and applied to pre-soaked wall areas with a long handled stiff fibered masonry wall washing brush, or other brush as recommended by the cleaning compound manufacturer. The cleaning solution may also be applied with a garden-type low pressure sprayer having a maximum nozzle pressure of 50 psi (3.5kg/cm²). Allow the solution to remain on the wall 5 to 10 minutes, or as recommended by the cleaning solution manufacturer. Wooden paddles or other non-metallic tools may be used to remove stubborn particles. Cleaning shall be restricted to small areas of up to 20 square feet at a time.
3. After washing a given area, the wall shall be flushed with a copious amount of clear water, working from top to bottom, before the solution dries on the wall surface. All of the cleaning solution shall be completely rinsed off of the wall.
4. Rinsing water may be applied with a high-pressure hose system with a maximum nozzle pressure of 700 psi. The high-pressure nozzle tips shall have a fan spray angle of from 15 to 45 degrees. The high-pressure system shall have a water flow rate of 3 to 8 gallons per minute. Care shall be taken to avoid damaging the brick unit or the mortar joints with the high-pressure water spray.
5. Repeat the procedure on spots which require additional cleaning.
6. Clean roof side and top of parapet walls.

3.4 CLEANING

- A. Construction Waste: In accordance with Section 01 74 19
- B. Water Pollution Control: In accordance with Greenbook/Whitebook requirements.
- C. Storm Water Control: In accordance with Greenbook/Whitebook requirements, Section 7-8.6.
- D. Environment Protection: In accordance with Greenbook/Whitebook requirements, Section 7-8.6.

END OF SECTION

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SECTION 04 05 15

MORTAR AND MASONRY GROUT

PART 1 GENERAL

1.1 SUMMARY

- A. Work performed under this section shall also comply with the requirements of the Structural Notes on the structural drawings.

1.2 SUBMITTALS

- A. Mix Designs: Submit mix designs and samples to the Structural Engineer for review prior to delivering materials to the site or commencing the Work.
 - 1. Mortar Mix Design: Furnish in accordance with ASTM C270.
 - 2. Grout Mix Design: Furnished by either the grout supplier or an independent testing laboratory. Submit comprehensive strength data with mix design submittals when pozzolans are used.
- B. Product Data: If alternative mortar materials are to be provided, submit current instructions stating the actual quantities and mixing instructions for alternative mortar materials to conform to specified requirements.
 - 1. Submit test report data substantiating compliance with specified performance requirements.
 - 2. Submit current ICC Evaluation Report.
- C. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Protection: Cementitious materials shall be stored off the ground, under cover and shall be kept dry.
- B. Preblended Mortar Mix Delivery System: The use of dry preblended mortar silos and bulk bags shall be acceptable. Bulk bags and silos shall be sealed to prohibit contamination of the ingredients and to keep the materials dry until mixed.

1.4 PROJECT/SITE CONDITIONS

- A. Physical Requirements for Proper Installation or Application:
 - 1. Hot Weather Requirements: Wet mortar board before loading and cover mortar to retard drying when not being used.
 - 2. Cold Weather Requirements: In accordance with "Recommended Practices and Guide Specifications for Cold Weather Masonry Construction" by IMIAC; provide adequate equipment for heating the mortar and grout materials, when air temperature is below 40 degrees F.. Temperatures of the separate materials, including water, shall not exceed 140 degrees F. when placed in the mixer. When air temperature is below 32 degrees F., maintain mortar temperature on boards above freezing.

PART 2 PRODUCTS

2.1 MATERIALS

A. General

1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
2. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.

B. Mortar:

1. Cement: Type II Portland cement conforming to ASTM C150, except that mortar used below grade shall have Type V Portland cement.
2. Aggregate: Clean, sharp and well graded and free from injurious amounts of dust, lumps, shale, alkali, surface coatings and organic matter, conforming to ASTM C144, except that no less than 3 percent nor more than 10 percent shall pass a No. 100 sieve.
3. Hydrated Lime: ASTM C207, Type S.
4. Water: Clean and potable.
5. Admixtures:
 - a. Chemical: The use of accelerator admixtures, water reducing plasticizers and other chemical admixtures shall not be allowed.
 - b. Mineral: In accordance with Section 03 05 05
 - c. Alternative Plasticizer: Pozzolanic formulation consisting of a combination of hydroxy aluminum silicates and diatomite:
 - 1) Alternative Plasticizer Manufacturer: Engaged in producing materials with a satisfactory performance record for at least 2 years.
 - 2) Mortar mix design shall be in accordance with ICC Evaluation Report, in accordance with the mortar type specified elsewhere in this specification.
 - 3) Provide alternative plasticizer in accordance with manufacturer's printed instructions, including specific mixing instruction.
 - 4) No other admixtures shall be used in conjunction with the alternative plasticizer unless approved in writing by the alternative plasticizer manufacturer.
 - 5) Packing and Shipping: Mortar admixture(s) shall be delivered to the job site in manufacturer's original containers with seals unbroken and labeled with manufacturer's batch number.

C. Grout:

1. Cement: Type II Portland cement conforming to ASTM C150.
2. Aggregate: ASTM C404 and as follows:
 - a. Sand: Size No. 1 for fine aggregate.
 - b. Pea Gravel: Size No. 8 for coarse aggregate.
3. Water: Clean and potable.

2.2 MIXES

- A. Mortar: ASTM C 270, Type S, except that mortar used below grade shall be Type M.
1. Measurement: Accurately measure materials by ASTM C270 by the Property Method per Table 2.
 2. Mix cementitious materials and aggregates 3 to 5 minutes in a mechanical mixer. Small amounts of mortar may be mixed by hand. Adjust consistency of the mortar depending on the absorptive quality of the units being laid, and to the satisfaction of the mason.
 3. If mortar begins to stiffen, it may be retempered by adding water within a basin formed by the mortar, and remixing.
 4. Use within 2-1/2 hours of initial mixing and no mortar shall be used after it has begun to set or after it has become harsh or non-plastic.
 5. Preblended Mortar Mix: Provide mortar as specified herein, except that dry ingredients may be preblended and bulk packaged for delivery to a jobsite silo (which loads into batch mixer) or bagged for hand loading into mixer. Moisture shall be extracted from sands. Digital printouts displaying the proportions of each batch shall be submitted to the Resident Engineer upon request. Mixing shall be accomplished by mechanical mixer in accordance with instructions provided by Preblended Mortar Mix Distributor.
- B. Grout:
1. Job-Site Mixed: In accordance with ASTM C476.
 2. Transit-Mixed:
 - a. Designed by the supplier or an independent testing laboratory with a minimum compressive strength of 2000 psi (140mPa) in 28 days, unless higher strength is required by the Structural Drawings and Notes.
 - b. Slump: Not to exceed 8 inches, unless otherwise noted on Drawings.
 - c. Use within 1-1/2 hours of initial mixing and use no grout after it has begun to set or after it has become harsh or non-plastic.
 - d. Course grout may be used in cavity walls with a horizontal dimension of 2 inches or more, and in hollow cell construction 4 inches or more in both horizontal directions.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Installation of mortar and grout shall be as specified under Section 04 22 00 – Concrete Unit Masonry.
- B. Temperature: Mortar and grout shall have a temperature between 50 degrees F. and 90 degrees F. while being used.
- C. Grout may be poured by hand bucket, concrete hopper or through a grout pump. Grout spaces shall not be wet down prior to pouring grout.

3.2 FIELD QUALITY CONTROL

- A. General: Tests and inspections as necessary to verify quality and strength of mortar and grout. Laboratory tests shall conform to applicable ASTM standards and tests.
- B. Tests:
1. Frequency: As determined by the Resident Engineer based upon total time for construction of masonry with not less than two tests per each level of masonry construction, foundation to roof or floors.
 2. Testing Laboratory: Inspection and testing of concrete mix will be performed by a testing laboratory in accordance with Section 01 45 00. The testing laboratory, in addition to meeting requirements of ASTM E329, must be an approved laboratory competent to perform cement physical testing.
 3. Distribution of Results of Tests: Within 24 hours of results of tests, copies of the results shall be submitted to the Resident Engineer, Contractor, masonry contractor, and the grout supplier if applicable.
- C. Mortar:
1. Property Specification (ASTM C270): Testing in accordance with ASTM C780.
 2. For determining hardened mortar properties, prepare 3 test specimens for each test age and property. A strength test shall be the average of the strengths of the specimens tested at the age specified. Specimens shall be tested at 7 and 28 days.
- D. Grout:
1. Testing per ASTM C1019.
 2. Three test specimens shall constitute one sample. A strength test shall be the average of the strengths of the specimen tested at the age specified.
 3. Specimens shall be tested at 7 and 28 days.
 4. The compression strength will be considered satisfactory if the average of three consecutive tests of the grout is equal to or greater than the specified strength and no individual strength test falls below the specified strength by more than 500 psi.

3.3 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises.
- B. Construction Waste: In accordance with Section 01 74 19.
- C. Storm Water Control: In accordance with Greenbook/Whitebook requirements, Section 7-8.6.
- D. Environment Protection: In accordance with Greenbook/Whitebook requirements, Section 7-8.6.

END OF SECTION

SECTION 04 05 23
MASONRY ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Furnishing the following items for installation under Section 04 2200:
1. Ties.
 2. Anchors.
 3. Control joints.
 4. Through wall flashings.
 5. Weep holes.

1.2 SUBMITTALS

- A. Product Data: Submit Manufacturer's brochures depicting each of the masonry accessories which will be used prior to delivering materials to the site or commencing the Work in this Section.
- B. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Storage and Protection: Store metal items at the site off the ground and in a manner to prevent damage to the materials.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Furnish products of one of the following Manufacturers, subject to compliance with Specification requirements.
1. Dur-O-Wall Inc. www.dur-o-wall.com
 2. Heckmann Building Products, Inc. www.heckmannbuildingprods.com
 3. Hohmann and Barnard, Inc. www.h-b.com
 4. Or equal.

2.2 MATERIALS

- A. Recycled Content
1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 2. Minimum 26% post-consumer and 7% pre-consumer recycled content.
- B. Steel Wire: ASTM A82, diameter as specified for accessory.
- C. Flat and Corrugated Sheet Steel: ASTM A653 or ASTM A568.
- D. Bar Anchor Material: ASTM A36.

- E. Galvanized Finish: ASTM A641, Class 1, mill galvanized for interior walls, or ASTM A153, Class B-2, hot dip galvanized for exterior walls.
- F. Reinforcing Steel: As specified in Section 03 20 00.

2.3 ACCESSORIES

- A. General: Anchors and ties shall be steel with zinc coated finish or shall be of other non-corrosive metal.
- B. Joint Reinforcing: Ladder type, galvanized steel rods of width 2 inches less than wall thickness conforming to ASTM A951, corrosion protective finish with longitudinal wires not less than 0.148 inch (3.75mm) or more than one half the mortar joint thickness and cross wires not less than 0.148 inch (3.75mm) nor more than the diameter of the longitudinal wires with cross wires projecting nor more than 1/8 inch (3.2mm) beyond the outside longitudinal wires. Joint reinforcing shall be in accordance with requirements of IBC 2009, Chapter 21, and the Structural Drawings.
- C. Anchors:
 - 1. Dovetail Anchor: 16 gage flat sheet steel, one inch wide, 5-1/2 inch length, designed for use with embedded slot or inserts.
 - 2. Bar Anchors: Machine made corrosion protected metal with cross section area not less than .25 square inch with ends turned up 2 inches, not less than 16 inches long for 8 inch walls nor less than 24 inches long for 12 inch walls.
- D. Control Joints:
 - 1. Rubber: Extruded, solid section, ASTM D2000 2AA-805 with a durometer hardness of 70 or 80 when tested per ASTM D2240.
 - 2. Polyvinyl Chloride (PVC): ASTM D2287, Type PVC 654-4 with a durometer hardness of 85 (+5) when tested per ASTM D2240, minimum tensile strength of 1750 psi with minimum 300 percent elongation per ASTM D638, and cold crack brittleness of 50 degrees F per ASTM D746.
 - 3. Sizes and Profiles: As indicated on Drawings.
- E. Joint Filler: Closed cell neoprene rubber conforming to ASTM D1056, Grade 2A1, oversized 50 percent, self expanding, 2-3/4 or 3 inch width by maximum length.
- F. Through-Wall Flashing:
 - 1. Granular surfaced Self-adhering, flexible flashing consisting of pliable and highly adhesive rubberized asphalt compound overall 60 mil thickness; protected from contamination from dust or dirt by a silicone-coated release sheet, to be removed immediately before installation.
 - 2. Vycor Basik as manufactured by W.R. Grace & Co. - Conn., Cambridge, MA (800) 558-7066 or equal.
 - 3. Provide wall flashing accessories (surface conditioner, termination mastic) as required to provide a complete installation.
- G. Weep Holes: polyethylene plastic tubing, 1/4 inch diameter x 4 inch long.

PART 3 EXECUTION

3.1 INSTALLATION

- A. General: Installation of masonry accessories shall be as specified under Section 04 22 00 – Concrete Masonry Units.
- B. Control Joints: Provide control joints 20'-0" minimum in run as indicated on Drawings and in accordance with the requirements of Specification Section for the masonry units.
- C. Through Wall Flashing:
 - 1. Provide through-wall flashings as indicated on Drawings and in accordance with the requirements of Specification Section for the masonry units.
 - 2. Specified flashing and accessories are not designed for use as a finished surface or for use in areas where they will be exposed to sunlight. Prevent contact with products containing fresh coal tar or coal tar pitch. Prevent contact with sealant products containing polysulfide polymers due to incompatibility.
 - 3. Remove deleterious materials from surfaces to be flashed.
 - 4. Apply surface conditioner by spray, brush or roller at the rate recommended by manufacturer to dirty or dusty surfaces or surfaces having an irregular or rough texture before installing flashing membrane.
 - 5. Remove silicone-coated release paper and position flashing carefully before placing it against the surface. When properly positioned, place against surface by pressing firmly into place by hand roller or blunt object, such as the backside of a utility knife. Fully adhere flashing to substrate to prevent water from migrating under flashing.
 - 6. Overlap adjacent pieces 2 inches and roll overlaps with a steel hand roller or a blunt object. Fully seal overlaps to prevent water leakage through laps. Trim bottom edge 1/2 inch back from exposed face of the building.
 - 7. At heads and sill where flashing is indicated to be placed, turn up ends a minimum of 2 inches and make careful folds to form a pan, with the pan seams sealed with compatible mastic acceptable to flashing manufacturer.
 - 8. Apply a bead or trowel coat of compatible mastic acceptable to flashing manufacturer along top edge, seams, cuts and penetrations. Seal penetrations through flashing with compatible mastic acceptable to flashing manufacturer.
- D. Weep Holes: Provide weep holes as indicated on Drawings and in accordance with the requirements of Specification Section for the masonry units.

3.2 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises.
- B. Construction Waste: In accordance with Section 01 74 19.

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SECTION 04 22 00

CONCRETE MASONRY UNITS

PART 1 GENERAL

1.1 SUBMITTALS

- A. Samples: If concrete masonry units are to be exposed to view in the final construction, submit samples to Resident Engineer for review prior to constructing job-site mock-ups, delivering materials to Site or commencing Work in this Section.
1. Provide 2 samples of each type and weight classification of concrete masonry units, (stretcher units), to be used on Project showing range of texture and/or color variations of exposed surfaces for units.
 2. Samples of burnished and split faced finishes shall be provided at manufacturing facility and shall be approved prior to manufacturing of units to be provided for the project.
 3. Units provided to Project shall match these samples.
- B. Certificates: Submit certification to the Resident Engineer prior to delivery of concrete masonry units to jobsite, signed by Concrete Masonry Unit Manufacturer, stating that the concrete masonry units to be supplied: 1) shall meet the specified requirements for concrete masonry units for exterior building wall construction, and; 2) are suitable for proposed usage.
- C. Test Reports:
1. Submit test results for concrete masonry units for exterior building wall construction to be used to Resident Engineer in accordance with Section 01 45 00.
 2. Test results shall clearly indicate:
 - a. Types of materials and composition.
 - b. Classification of concrete masonry unit in accordance with ASTM C90 requirements.
 - c. Water penetration and leakage in accordance with testing specified under Source Quality Control specified in this section.
 3. Testing laboratory shall notify Resident Engineer of non-conforming material submittals.
- D. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.2 QUALITY ASSURANCE

- A. Standards: Comply with the requirements of ACI 530.1/ASCE 6 "Specifications for Masonry Structures", except as otherwise indicated.
- B. Regulatory Requirements: Masonry materials and workmanship shall meet requirements of building codes which are applicable to jurisdiction in which Project is located.

- C. Mock-Ups: If concrete masonry units are to be exposed to view in the final construction, prior to start of Work, construct a sample panel from approved materials, containing each different kind or color of concrete masonry units, approximately 4 feet high x 6 feet long or as required to illustrate wall design under direction of Resident Engineer. Sample wall shall not be incorporated into the final work.
1. Sample wall shall provide a standard of workmanship, bond, thickness, tooling of joints and finishes (precision, burnished and split face).
 2. Construct successive sample panels until standard is approved.
 3. When accepted, sample wall shall be standard of comparison for remainder of masonry Work.
 4. This sample, when accepted by the Resident Engineer, will function as a reference base for acceptance or rejection of final work.
 5. Sample wall shall be reviewed by the Resident Engineer for acceptance.
 6. Upon completion of Project, remove sample wall from site and dispose of in a legal manner.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Transport and handle masonry units in such a manner as to prevent chipping and breakage.
- B. Deliver and store materials in dry, protected areas.
- C. Keep free of stain or other damage.
- D. Locate storage piles, pallets, stacks or bins to avoid or protect material from heavy or unnecessary traffic.
- E. Replace damaged material at no cost to Owner.

1.4 PROJECT/SITE CONDITIONS

- A. Hot Weather Requirements:
 1. When ambient air temperature exceeds 100 degrees F., or when ambient air temperature exceeds 90 degrees F. and wind velocity is greater than 8 mph, Masonry Contractor shall implement hot weather protection procedures as submitted to Resident Engineer.
 2. Do not spread mortar beds more than 4 feet ahead of placing block units.
 3. Place block units within one minute of spreading mortar.
- B. Cold Weather Requirements:
 1. Fully protect concrete masonry units against freezing by a weather-tight covering which shall also prevent accumulation of ice.
 2. Do not lay concrete masonry units when temperature of surrounding atmosphere is below 40 degrees F. or is likely to fall below 40 degrees F. in the 24 hour period after laying, unless adequate protection is provided.
- C. Field Measurements:
 1. Verify measurements shown on Drawings by taking field measurements.
 2. Proper fit and attachment of concrete masonry units is required.

1.5 SCHEDULING AND SEQUENCING

- A. Coordination: Coordinate with other Trades whose Work relates to concrete masonry unit installation for placing required blocking, backing, furring, conduits and other items.

PART 2 PRODUCTS

2.1 MATERIALS

- A. General Requirements for Concrete Masonry Units:
1. CMU shall comply with the requirements of the Structural Notes on the structural drawings.
 2. Concrete masonry units shall meet ASTM C90 requirements except that when CMU will be exposed in final construction, ASTM C90 shall be modified to read: "Three percent of a shipment containing chips not larger than 1/2 inch in any dimension, or cracks not wider than 0.02 in. and not longer than 10% of the nominal height of the unit is permitted." Linear shrinkage of units of units shall not exceed 0.065 percent.
 3. Units shall be in the same condition in wall as they were upon delivery.
 4. Unit sizes shall be as shown on Drawings.
 5. Texture and color shall be consistent for all units provided for exposed walls. Range of texture and color shall be within that shown by samples and mockups reviewed by Resident Engineer.
 - a. Color: Exposed faces of CMU to be yellow gold color with red and black cinders with appropriate recycled content for both building and fencing.
 - b. Building Exterior Surface for public view:
 - 1) Burnished at exterior with precision finish interior
 - 2) Basis of Design: Regalstone block as manufactured by RCP Block and Brick www.rcpblock.com or equal.
 - 3) Exterior surface exposed to view shall have burnished finish on 1, 2 or 3 faces as required by the design.
 - c. Fence Exterior Surface for public view:
 - 1) Split faced with precision finish toward private yard.
 - 2) Exterior surface exposed to view shall have split on 1, 2 or 3 faces as required by the design.
 6. Surface of units shall be clean and free from dirt when laid in walls.
 7. Units not complying with the appropriate ASTM Standards shall not be laid in the wall where exposed to view. Any unit that is chipped in excess of the requirements will be rejected and shall be removed and replaced.
 8. Provide special block sizes and shapes required or as shown on Drawings.
 9. CMU may be used for construction of building walls exposed to the exterior if they comply with requirements specified under Source Quality Control.
 10. Provide units of uniform color and appearance where the completed CMU wall is indicated to be provided with water repellent specified in Section 07 19 00 or which will receive anti-graffiti coatings as specified in Section 09 96 23.
 11. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 12. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
- B. Hollow CMU Classifications: The following requirements shall apply to all shapes, colors, textures and sizes of CMU provided.
1. Lightweight units:
 - a. Weighing less than 105 lbs. per cubic foot and manufactured from volcanic scoria aggregate per ASTM C331.
 - b. These units shall not be used for exterior construction exposed to weather unless they comply with the requirements specified under Source Quality Control, and if they receive a water repellent coating as specified in Section 07 19 00 (when approved by water repellent manufacturer).

2. Medium weight units:
 - a. Weighing 105 lbs. per cubic foot to less than 125 lbs. per cubic foot and manufactured from a combination of volcanic scoria aggregate conforming to ASTM C331 and sand conforming to ASTM C33.
 - b. These units may be used for exterior construction in an exposed condition:
 - 1) If they comply with the requirements specified under Source Quality Control
 - 2) If they receive a water repellent coating as specified in Section 07 19 00 (when approved by water repellent manufacturer), or; if a finish such as stucco or elastomeric paint will be applied or using an integral water repellent (when approved by integral water repellent manufacturer).
 3. Normal weight units:
 - a. Weighing 125 lbs. per cubic foot or more and manufactured with sand conforming to ASTM C33.
 - b. These units may be used for exterior construction in an exposed condition:
 - 1) If they comply with the requirements specified under Source Quality Control
 - 2) If they receive a water repellent coating as specified in Section 07 19 00 (when approved by water repellent manufacturer), or; if a finish such as stucco or elastomeric paint will be applied or using an integral water repellent (when approved by integral water repellent manufacturer).
- C. Accessory Units: Provide units as required for window sills and jambs, doors, control joints, bond beams, lintels, pilaster, caps and other locations as indicated on Drawings with a minimum of block cutting. Accessory units shall match adjacent unit color and texture unless noted otherwise.

2.3 ACCESSORIES

- A. Joint Reinforcing: In accordance with Section 04 05 23 and Structural Notes.
- B. Reinforcing Steel: As specified under Section 03 20 00.
- C. Control Joints:
 1. Rubber: Extruded, solid section, ASTM D2000 2AA-805 with a durometer hardness of 70 or 80 when tested per ASTM D2240.
 2. Polyvinyl Chloride (PVC): ASTM D2287, Type PVC 654-4 with a durometer hardness of 85 (+5) when tested per ASTM D2240, minimum tensile strength of 1750 psi with minimum 300 percent elongation per ASTM D638, and cold crack brittleness of 50 degrees F per ASTM D746.
 3. Sizes and Profiles: As indicated on Drawings.
- D. Mortar and Grout: As specified under Section 04 05 15.
- E. Nailing Strips: See Section 06 10 53 – Miscellaneous Carpentry.
- F. Sheet Metal Flashings: See Section 07 6000. Furnish shapes in accordance with project requirements and NCMA TEK 19-2A, 19-4A and 19-5A.
- G. Steel Lintels: As indicated or scheduled on Structural Drawings.

2.4 SOURCE QUALITY CONTROL

- A. Concrete masonry units to be provided for exterior exposed building wall construction shall be tested by manufacturer using a spray bar test as follows:
 1. Testing shall be performed at no additional cost to Owner.
 2. Individual concrete masonry units shall be placed on a rack where water is sprayed at a rate of 140 gallons per hour for a minimum of 4 hours.
 3. Testing shall be made upon concrete masonry units prior to application of post-applied water repellent.
 4. Test results for units regularly manufactured using a standard mix design within the previous 6 months shall be acceptable.
 5. Test results shall meet or exceed the following:

Location	Results
Inside front face shell	<20% damp (no running water or sheen)
Center web	Dry
Inside outer web	<10% damp
Inside of back face shell	Dry
Outside of back face shell	Dry

- 6. Submit test reports as specified herein under "Submittals."

PART 3 EXECUTION

3.1 EXAMINATION

- A. Installer shall examine supporting structure and conditions under which unit masonry is to be installed, and notify Contractor, in writing, conditions detrimental to proper and timely completion of Work. Do not proceed with the installation of unit masonry Work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.
- B. Do not use units with chips, cracks, or other defects which might be visible in the finished Work unless otherwise acceptable to the Resident Engineer.
- C. Do not build on frozen Work; remove and replace unit masonry Work damaged by frost or freezing.
- D. Do not use frozen materials or materials mixed or coated with ice or frost. Do not lower freezing point of mortar by use of admixtures or anti-freeze agents, and do not use calcium chloride in mortar or grout.

3.2 PREPARATION

- A. Protection: Protect sills, ledges, offsets and other projections from dropping of mortar and grout.

3.3 ERECTION, INSTALLATION, APPLICATION

- A. General Requirements for Concrete Masonry Walls:
 1. Workmanship: Concrete masonry units which will be exposed in the finished work shall be treated as an architectural finish and shall be handled carefully to ensure that chippages do not occur during handling and laying. Handling shall be minimized on the jobsite to eliminate chances for chippage.

2. Lay units in uniform and true courses, level and plumb to height indicated on Drawings.
 3. Lay concrete unit masonry in such a way that cracks are not formed at time unit is placed in wall.
 4. Units shall not be wetted before being used and shall be laid dry.
 5. Adjusting Units:
 - a. Units shall be adjusted to be level, plumb and straightened into final position in wall while mortar is still soft and plastic enough to ensure a good bond.
 - b. Avoid over-plumbing and pounding of corners and jambs to fit stretcher units after they are set in position.
 - c. If position of unit is shifted after mortar has stiffened, or bond is broken or cracks are formed, re-lay unit in new mortar.
 6. Bearings on Walls: Provide 3 courses of solid units or grouted hollow masonry units below steel bearing plates or beams bearing on walls. Extend bearings each side of contact with load as required to properly transfer loads into wall.
 7. Openings: Provide openings in masonry walls where required or indicated. Steel lintels shall be provided unless otherwise noted.
 8. Cutting of masonry: When required, exposed block units shall be cut with a power driven Carborundum or diamond disc blade saw. When using "wet" cutting methods, clean water shall be used on exposed units.
- B. Bonding:
1. Bond pattern shall be regular running bond unless indicated otherwise on the drawings.
 2. Bond shall be plumb throughout face of wall.
- C. Bearing Wall Intersections:
1. Intersecting block bearing walls shall not be tied together in a masonry bond, except at corners.
 2. One wall shall terminate at face of other wall with a control joint at intersection.
 3. Tie intersecting wall together with a metal tie bar, 1/4 inch x 1-1/4 inches x 2'-4" long with a 2 inch right angle bend at each end of bar, spaced vertically at 2 feet on center.
 4. Bends at ends of tie bars shall be embedded in grouted cells.
 5. Rake out vertical joint between intersecting walls to a depth of 3/4 inch after mortar has stiffened.
 6. Provide sealing of control joint as specified in Section 07 92 00.
- D. Non-Bearing Wall Intersections:
1. Tie non-bearing wall together with strips of metal lath or galvanized 1/4 inch mesh hardware cloth placed across joint between 2 walls placed in alternate horizontal block courses.
 2. Rake out vertical joint between intersecting walls to a depth of 3/4 inch after mortar has stiffened.
 3. Provide sealing of control joint as specified in Section 07 92 00.
- E. Joining of Work:
1. Where fresh masonry joins partially set masonry the exposed surface of the set masonry shall be cleaned and lightly wetted so as to obtain the best possible bond.
 2. Remove loose concrete block and mortar.
 3. Stop-off a horizontal run of masonry by racking back 1/2 brick length in each course and, if grout is used, stopping the grout 4 inches back of the rack.
 4. Tooling will not be permitted, except upon written approval of the Resident Engineer.

F. Mortar Joints:

1. Joints shall be straight, clean and a uniform 3/8 inch thickness on exposed wall face and in accordance with NCMA TEK 19-2A.
2. Exposed vertical and horizontal joints shall be tooled when mortar is "thumbprint" hard with round or other approved jointer, slightly larger than the width of the joints to produce a dense, slightly concave or "V" tooled surface (as indicated on Drawings) which is well bonded to block at edges. Raked joints shall not be used on single wythe exterior building wall construction.
3. Joints shall be tooled flush at:
 - a. Below grade and planter surfaces to receive dampproofing or waterproofing,
 - b. Interior or exterior surfaces to receive ceramic tile, stucco, plaster or other finishes requiring flush joints that are to be concealed.
4. Solidly fill joints from face of unit to depth of face shell, except where specified otherwise.
5. Full bedding to be provided for first course on foundation and wherever maximum strength is required.
6. Butter vertical head joints well and shove these joints tight so that mortar bonds well to both units.
7. Full coverage to be provided on bed of face shells and webs surrounding cells to be filled.
8. Bee-holes or other open joints shall be filled and tooled with mortar while mortar is still fresh.

G. Control Joints:

1. Provide control joints, as detailed, at vertical masonry walls where such walls exceed 40 feet in length. In long length of walls, provide joints at approximately 24 feet on center or as detailed.
2. Control joints shall be continuous full height of walls.
3. At bond beams, control joints shall separate both block and grout; however, steel reinforcing shall be continuous.
4. Horizontal wire reinforcing shall not run through control joint.
5. Control joints shall not occur at wall corners, intersections, ends, within 24 inches of concentrated points of bearing or jambs or over openings unless specifically indicated on Structural Drawings.
6. Control joint materials shall be held back from finished surface as required to allow for sealant and back-up materials.

H. Horizontal Joint Reinforcing:

1. Place horizontal joint reinforcing every 16 inches vertically throughout wall construction.
2. Continuously reinforce first bed joint immediately above and below openings. Provide reinforcing in second bed joint above and below openings which extends 2 feet beyond each side of opening.
3. Lap reinforcement a minimum of 6 inches at splices.
4. Cut and bend reinforcing at corners.

I. Vertical Reinforcing and Bond Beam Reinforcing: As indicated on Structural Drawings.

J. Grouting:

1. Reinforcing steel is to be in place and inspected before grouting starts.
2. Vertical cells to be filled shall have vertical alignment to maintain a continuous cell area.
3. Keep cell to be grouted free from mortar.
4. Fill cells solidly with grout in lifts not to exceed 4 feet.

5. Grout may be poured by hand bucket, concrete hopper or through a grout pump.
 6. Do not wet down grout space prior to pouring of grout.
 7. Stop pours 1-1/2 inches below top of cell to form a key at pourpoints.
 8. Grout shall be consolidated by mechanical vibration during placing before loss of plasticity in a manner to fill grout space. Grout pours greater than 12 inches shall be reconsolidated by mechanical vibration to minimize voids due to water loss. Grout pours 12 inches or less in height shall be mechanically vibrated, or rodded.
 9. Grout barrier below bond beams shall be continuous wire lath or other approved material.
 10. Grout beams over openings and bond beams in a continuous operation.
 11. Solidly grout in place bolts, anchors and other items within wall construction.
 12. Fully grout jambs and head of metal door frames connected to masonry. Filling of frames shall be done as each 2 feet of masonry is laid.
 13. Use extreme care to prevent grout or mortar from staining face of the masonry.
 14. Immediately remove grout or mortar which is visible on face of masonry.
- K. Provisions for Other Trades and Built-in Items:
1. Build in items required and indicated, including; but not limited to, reinforcing steel, anchors, flashings, sleeves, frames, structural steel, loose lintels, anchor bolts, nailing blocks, door and window frames and miscellaneous iron.
 2. Enclosures for pipes, stacks, ducts and conduits:
 - a. Construct slots, chases, cavities, and similar spaces as required.
 - b. Where masonry is to enclose conduit or piping, bring it to proper level indicated and as directed.
 - c. Cover no pipe, conduit chases or enclosures until advised that Work has been inspected and approved.
- L. Tolerances - Standard Level of Quality:
1. External corners and other conspicuous lines and levels: +/- 1/2 inch in any 10'-0" section.
 2. Line of sealant filled movement joints (allowable deviation from specified or indicated): +/- 1/2 inch in any 10'-0" section.
 3. Actual cross sectional dimension of columns and walls (allowable deviation from specified or indicated): - 3/8 inch, + 3/4 inch.
 4. Adjacent unit faces in plane (allowable deviation from specified or indicated): +/- 3/16 inch.
 5. Mortar bed joint thickness (allowable deviation from specified or indicated): -1/8 inch, +1/4 inch.
 6. Mortar head joint thickness (allowable deviation from specified or indicated): - 1/4 inch, + 3/8 inch.
 7. Vertical alignment of the centerline of corresponding head joints in alternate courses when using other than stack bond (allowable deviation from specified or indicated): +/- 5/8 inch.
 8. Vertical alignment of the centerline of all head joints in a total wall height not to exceed 30'-0" when using other than stack bond (allowable deviation from specified or indicated): +/- 2 inches.
 9. Vertical alignment of the centerline of all head joints in total wall height not to exceed 30'-0" when using stack bond: (allowable deviation from specified or indicated): +/- one inch.
- M. Joint and Crack Control: In accordance with NCMA TEK 10-1.
- N. Flashing: In accordance with NCMA TEK 19-2A, 19-4A and 19-5A and 19-4.
- O. Weep holes shall be provided above lintels and vertical obstructions as per manufacturer's flashing and weep hole diagrams.

3.4 FIELD QUALITY CONTROL

- A. Masonry Tests: Inspection and testing of masonry will be performed by a testing laboratory in accordance with Section 01 45 00.
1. Provide free access to Work and cooperate with appointed firm.
 2. A set of 3 masonry prisms shall be built and tested in accordance with ASTM C1314 (formerly E447) Method B for each 5,000 square feet of wall area, but not less than one set of 3 masonry prisms for the Project.
 3. Water testing of CMU exterior building walls shall be provided as specified in Section 07 19 00.

3.5 ADJUSTING

- A. Pointing of Mortar Joints:
1. Point and fill holes and cracks in exposed mortar joints.
 2. Cut out defective mortar joints to a depth of at least 1/4 inch.
 3. When cutting is complete, remove dust and loose material by brushing or vacuuming.
 4. Prehydrate mortar for pointing by mixing dry ingredients with only sufficient water to produce a damp mass of such consistency that it will retain its form when it is pressed into a ball with hands, but will not flow under trowel.
 5. Allow mortar to stand for a period of not less than one hour nor more than 2 hours, after which remix with addition of sufficient water to produce satisfactory workability.
 6. Pointing mortars shall be identical to adjacent mortar in similar joints and finish results shall match and be indistinguishable from original mortar used.
 7. Premoisten joint and apply mortar tightly.
 8. Tool to match adjacent joints.
 9. Moist cure for 72 hours.
- B. Patching: If approved by Resident Engineer, patching of exposed masonry walls shall be done at conclusion of general Work and shall conform as closely as possible to similar surrounding or adjoining Work.

3.6 CLEANING

- A. Daily Cleaning: Keep walls clean. Soiled masonry from mortar and grout spills which will be exposed to view at completion of Project shall be cleaned immediately with stiff fiber brushes until wall is free of dropped or spattered mortar.
- B. Remove scaffolding and equipment used in Work.
- C. Clean up debris, refuse and surplus material and remove from premises.
- D. Construction Waste: In accordance with Section 01 74 19.
- E. Storm Water Control: In accordance with Greenbook/Whitebook requirements, Section 7-8.6.
- F. Environment Protection: In accordance with Greenbook/Whitebook requirements, Section 7-8.6.

3.7 PROTECTION

- A. Furnish temporary protection for exposed masonry corners subject to injury.
- B. Carefully cover tops of walls left incomplete at conclusion of day's Work with tarpaulins or other approved covering.
- C. In hot and dry weather, protect masonry against too rapid drying.
- D. Protect finished Work against freezing for a period of not less than 48 hours by means of enclosures, artificial heat, or such other protective methods as may be required.

END OF SECTION

SECTION 05 10 00

STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Structural steel framing including, but not limited to:
1. Columns
 2. Beams
 3. Lintels
 4. Anchor Bolts
 5. Bearing Plates,
 6. Miscellaneous Structural steel items.
- B. Work performed under this section shall also comply with the requirements of the Structural Notes on the structural drawings.

1.2 SUBMITTALS

- A. Shop Drawings: Submit shop and erection Drawings clearly showing each piece required for fabrication and erection. Drawings shall include material grade, camber, holes and other pertinent data. Indicate welds by standard AWS symbols showing size, length, and type of each weld.
- B. Test Reports: Submit reports for welded connection tests.
- C. Submit anchor setting drawings clearly showing location of all anchor bolts and embedded plates to be anchored in concrete and masonry construction. Provide templates for anchor bolts.
- D. Product Data Form:
1. In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.
 2. In addition to the Products Forms required by Section 01 33 00, provide the following LEED information for structural metal framing:
 - a. Section IV – Materials and Resources (MR) Credit Contribution
 - 1) MR Credit 4.0 – Recycled Content
 - a) Post Consumer (%)
 - b) Post Industrial (%)
 - 2) MR Credit 5.0 – Local / Regional
 - a) Manufacturing Location and Distance to Jobsite
 - b) Raw Material Harvest/Extraction Location and Distance to Jobsite
 - b. Section V – Indoor Environmental Quality (EQ) Credit Contribution
 - 1) EQ Credit 4.2 – Paints and Coatings (Touch up primers used on steel installed in place which is exposed to interior)
 - a) Non-Flat (VOC Content) (As applicable to primer)
 - b) Flat (VOC Content) (As applicable to primer)
 3. Other information requested on LEED™ Credit Contribution Sheet (e.g. EQ Credit 4.1 – Adhesives and Sealants) is not applicable and is to be left blank.

1.3 QUALITY ASSURANCE

- A. Welding:
 - 1. Performed by certified welders in compliance with AWS D.1 Structural Welding Code.
 - 2. Welders shall be duly qualified within the last 12 months in the position in which they are to weld and the qualifications and Specifications for workmanship shall comply with the AWS requirements "AWS Structural Welding Code -Steel."
- B. Certifications:
 - 1. Prior to fabrication or shipment of material to the job site, furnish certification of the Manufacturer of the structural steel that material furnished meets or exceeds requirements of ASTM standards specified or noted on Drawings, for each type of material.
 - 2. Prior to site welding operation, submit welders' written certifications and qualifications.
- C. Tolerances: All steel exposed to view shall be architectural steel, and tolerances as a minimum shall comply with section 10 of AISC code of standard practice.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Exercise care during unloading, storage and erection to avoid damage. Dumping on the ground is not permitted.
- B. Support material stored at the site completely free of the ground, and cover to avoid damage from the elements.

PART 2 PRODUCTS

2.1 MATERIALS

- A. General: Materials shall be new, of uniform quality, suitable and without defects affecting the strength or service of the structure.
 - 1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 - 2. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
- B. Structural Steel: ASTM A992 (Fy = 50ksi), except angles, channels and plates shall be ASTM A36 (Fy = 36ksi).
- C. Steel Pipe Columns: ASTM A53 Grade B (Fy = 35,000 psi).
- D. Steel Tube Columns (HSS shapes – Box or Round): ASTM A500, Grade B (Fy = 46,000 psi).
- E. Bolts:
 - 1. Machine Bolts: ASTM A307, unless otherwise indicated.
 - 2. High Strength Bolts: ASTM A325.
- F. Welded Anchors and Shear Connectors: ICC approved, as manufactured by KSM, Nelson or equal..
- G. Welding Rods: AWS A5.0, E70 series, low hydrogen type.

- H. Metal Primer: VOC compliant.
 - 1. Interior Steel:
 - a. Zinc oxide, alkyd primer, high-solids content, conforming to SSPC-Paint 25.1.
 - b. Primer used within the interior of the building shall be in accordance with the low-emitting materials requirements of Section 01 60 00 - Materials and Equipment.
 - 2. Exterior Steel (exposed): 2-component, moisture-cured zinc-rich primer conforming to SSPC-PS 12.01.

2.2 FABRICATION

- A. Workmanship and details of construction (except as otherwise indicated or specified) shall be in conformity with applicable articles of the latest AISC Manual, Parts 1 through 4; AISC Specifications; except Section A7 (Design Documents) and Chapter N (Plastic Design); and the applicable building codes. Sections 3.1, 3.4 and 4.2 of AISC code of Standard Practice are specifically excluded from this work.
 - 1. Sections shall be of dimensions, weight and design as indicated, assembled complete at the shop, with base plates and other detailed materials attached.
 - 2. Furnish 1/4 inch thick leveling plates at columns where base plates are shop fabricated to columns.
 - 3. Make connections as indicated or detailed, on the Drawings and the reviewed shop and erection Drawings.
 - 4. Exposed steel shall have smooth, clean surfaces with no identifying trade marks, names etc., exposed to view.
 - 5. Leave in condition for finish painting.
- B. Bolted connections shall be as detailed or shall conform to AISC standard bolted connections with maximum number of 3/4-inch diameter bolts. See Framed Beam Connections Tables II, III, or IV of AISC Manual of Steel Construction.
- C. No slotted holes permitted at steel connections unless shown on Drawings or approved by Structural Engineer.
- D. Where bolt holes in steel members are enlarged to more than 1/16 inch diameter oversize, provide 3/16 inch x 2-1/2 inch x 2-1/2 inch plate washers to steel members with 3/16 inch fillet weld all around.
- E. Loose Steel Lintels: Provide loose structural steel shape lintels for openings and recesses in masonry walls and partitions, as shown. Weld adjoining members together to form a single unit. Provide not less than 4 inch bearing at each side of openings, unless otherwise shown.
- F. Loose Bearing Plates: Provide loose bearing plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required.

2.3 SHOP FABRICATION FOR USE OF HIGH STRENGTH BOLTS

- A. Joint surfaces, including those adjacent to the bolt heads, nuts or washers, shall be free of loose mill scale, burrs, or any foreign material (including paint). Field paint these areas with the specific shop paint after erection and completion.

- B. Joints using high strength bolts shall be inspected by a representative of an independent testing laboratory acceptable to the Owner's Representative.
 1. Inspection shall be accomplished by the use of a properly calibrated torque wrench.
 2. Calibration shall be by the procedure specified in the Specifications for structural joints using ASTM A325 or A490 bolts, under Section 9, inspections (pp. 6-276) Ninth Edition, AISC Manual of Steel Construction.
 3. Check a minimum of 20 percent of the bolts in each connection.
 4. If one or more of the bolts checked in any connection is below the minimum tension, check all of the bolts in that connection.
 5. Bolts which cannot be properly tensioned will be rejected.
- C. Check calibrated wrenches individually for accuracy at least once daily for actual conditions of application.
- D. The Inspector shall check to insure that bolt threads are eliminated from the shear planes. Submit copies of the torque reading for each connection directly to the Architect and Structural Engineer in the form of a report, along with the minimum torque values required to reach the specified tensions and the calibration procedures.
- E. The use of load indicator washers or twist-off spline type of fastener requires specific prior approval of the Architect and Structural Engineer.

2.4 SHOP WELDING

- A. Make welds by the electric-arc process.
- B. Grind exposed welds smooth.
- C. Where weld size is not indicated, it shall develop full strength of member and connection.

2.5 PAINTING - SHOP COAT

- A. Items of steel and iron Work indicated or specified to be encased in concrete shall not be painted.
- B. Clean steel Work by wire brushing, or by other means selected by the fabricator, of loose mill scale, loose rust, accessible weld slag, or flux deposit, dirt and other matter. Remove oil and grease deposits by solvent. Solvents used shall be low toxic and meet the standards of Section 01 60 00.
- C. After cleaning, give steel Work one coat of metal primer.
 1. Apply primer thoroughly and evenly to dry surfaces by brush, spray, roller coating, flow coating or dipping at the selection of the fabricator.
 2. See also Section 09 91 00 for requirements regarding paints for compliance with LEED™ requirements.
- D. Apply primer at a rate of 350 sq. ft. per gallon to provide a wet film of 4.5mils.
- E. Paint erection marks on painted surfaces. Touch-up surfaces where welding, grinding of welds, joints, etc. are done in the field.
- F. The paint shall be thoroughly dry before the members are handled or loaded.

2.6 SOURCE QUALITY CONTROL

- A. Tests: Where a welded splice is fabricated in beams or columns other than those detailed, fabricator shall have splice connection tested using one of the following methods: magnetic particle, radiographic, or ultrasonic. Testing shall be conducted by an independent testing laboratory and a report submitted to the Architect and Resident Engineer. The costs of this testing shall be borne by the fabricator.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions:
1. Verify anchor bolt locations, grouting and elevation of base and setting plates, and other material set by other Trades before commencing Work.
 2. Notify Architect and Structural Resident Engineer of Work set by others which does not comply with specified tolerances. Do not erect material upon such Work until it has been satisfactorily corrected.
 3. Start of Work implies acceptance of Work of other Trades affecting structural frame erection.

3.2 ERECTION

- A. Erect Work to the proper lines and levels, plumb and true, and in correct relation to other Work maintain this condition to completion.
- B. Connections:
1. Machine Bolting:
 - a. Fair-up holes with pins to align holes before bolting.
 - b. Ream unfair holes to obtain alignment or drill new holes.
 - c. Enlargement of holes with drift pins or burning of new holes is not permitted.
 - d. Draw bolts up tight after members are aligned and leveled, and set or deform threads to prevent loosening.
 2. Welding:
 - a. Weld by shielding arc method per AWS standard code for arc and gas welding in building construction.
 - b. Submit certification that welders have passed AWS code qualification tests.
 - c. Refer to Shop Drawings for weld size and dimensions.
 - d. Close joints exposed to weathering with continuous 1/8 inch weather welds.
 - e. Grind smooth exposed welds, but grinding shall not reduce weld strength or required cross section.
 - f. Protect finish material from damage due to welding.
 - g. Remove unsatisfactory welds by chipping or arc air method.
 3. Connect members temporarily and align completely before making permanent connections.
 - a. Temporary conditions shall consist of bolts in no less than 1/3 of the holes and in no case less than 3 bolts in any single connection.
 - b. Surfaces in contact shall be thoroughly clean when assembled.
 - c. Provide necessary temporary bracing and guying to align the structure properly for permanent connections, and safely resist erection, dead load and wind stress.

- d. Take particular care to have the Work plumb and level (maximum slope ratio tolerance 1 to 500 for interior members, 0 to 1000 for exterior members) before making permanent connections.
 - e. Remove bracing and guys only after permanent alignment and assembly and structure is capable of completely sustaining design and temporary construction loads.
- C. Exposed Steel:
- 1. Verify the condition of exposed steel after erection.
 - 2. Exert particular care to provide a neat, accurate installation with members straight and true, corners and edges square, sharp and free from burrs and irregularities, adjacent members perfectly matched and no bolts or rivets exposed.
 - 3. Remove erection bolts and seats and plug weld and grind holes smooth.
- D. Touch-up Painting:
- 1. Remove temporary guys, bracing and bracing clips, and grind flush remaining burrs, before painting. Remove welding slag, spatter, rust and burnt paint and wire brush clean welds before touch-up.
 - 2. Touch-up Painting: Touch-up welds, abrasions, bolted connections, and other areas where shop prime paint has been removed or is damaged with specified prime paint or galvanizing repair paint.

3.3 CLEANING

- A. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of away from premises.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

SECTION 05 31 00

STEEL DECK

PART 1 GENERAL

1.1 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Increase S and I properties for simple or two span continuous to achieve equivalent load capacity. Minimum allowable diaphragm shear furnished, per ICC report, shall be as indicated on Drawings.
 - 2. Sections and properties shall meet AISC Specifications.

1.2 SUBMITTALS

- A. Shop Drawings: Submit shop and erection Drawings showing layout, material and fastening methods and each piece to be erected. Note deck welding pattern and physical properties of decking.
- B. Report: Submit ICC report showing diaphragm shear test.
- C. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 QUALITY ASSURANCE

- A. Welding: Performed by certified welders in compliance with AWS D.1.3 requirements and procedures for manual shielded metal arc welding.
- B. Certifications:
 - 1. Prior to fabrication or shipment of material to the job site, furnish certification of the manufacturer of the steel decking that material furnished meets or exceeds requirements of ASTM standards specified or noted on Drawings, for each type of material.
 - 2. Prior to site welding operation, submit welders' written certifications and qualifications.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle metal decking in manner which will prevent damage or deformation.
- B. Stack decking stored at the site before erection on platforms or pallets, and suitably protect from the weather.
- C. Exercise special care so as not to damage or overload the decking during the construction period.
- D. Do not use metal decking for storage or as a working platform until the sheets have been welded in position.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Furnish products of one of the following Manufacturers, except as approved by Architect and Structural Resident Engineer, subject to conformance with Specification requirements:
1. Consolidated Systems, Inc. www.csisteel.com
 2. Metal Deck, Inc.
 3. United Steel Deck, Inc. www.njb-united.com/usd.htm
 4. Verco Manufacturing, Inc. www.vercodeck.com
 5. Vulcraft Division, Nucor Corp. www.vulcraft.com/sc
 6. Wheeling Corrugating Division www.wheelingcorrugating.com
 7. Or equal.

2.2 MATERIALS - GENERAL

- A. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
- B. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.

2.3 RIBBED DECK

- A. Provide one-hour rated steel deck for concrete system and accessories as shown on sheet S1.2 of the Structural Drawings.

2.4 ACCESSORIES

- A. Furnish miscellaneous supporting members at openings and edges, as shown on Drawings and as required.
- B. Galvanizing Repair Paint: High zinc-dust content paint complying with SSPC Paint 20 (94 percent minimum zinc dust content, dry film, by weight). Comply with Section 01 60 00 requirements for low-emitting materials used within interior of structure.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Erector shall examine subsurfaces to receive Work and report detrimental conditions, in writing, with a copy to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Before proceeding, verify that required inspections of existing conditions have been completed.

3.2 ERECTION - RIBBED DECK

- A. Place deck sheets in accordance with approved erection layout Drawings.
- B. Deck units shall be fabricated to span three or more support spacings, with end laps of at least two inches which shall occur over supports. Male joint of side laps shall engage female joint by at least 5/8 inch.

- C. Openings shown on the erection layout Drawings shall be cut by the deck erector. Openings not shown on the erection diagram, such as those required for stacks, conduits, plumbing vents, etc. shall be cut and reinforced if necessary, by the Trade requiring the openings.
- D. Attach deck to supporting members by fusion welding. Care shall be exercised by the welder in the selection of electrodes and amperage to provide positive welds and prevent high amperage blow holes. Welds shall be made from the top side of the deck with the welder following close behind the placement crew.
- E. Welding washers are not necessary for ribbed deck of 22 gauge or heavier, or when the bottom rib width equals or exceeds 5/8 inch.
- F. Where washers are required, weld deck to steel framing through 16 gauge welding washers with 1 inch x 3/8 inch puddle welds. Maximum weld spacing shall be as follows unless noted otherwise on the Structural Drawings:
 - 1. End and end laps: 6 inches o.c.
 - 2. Intermediate supports: 6 inches o.c.
 - 3. Edges, perimeter beams and angles parallel to deck flutes: 12 inches on center
 - 4. Opening edges: 6 inches on center
- G. Weld sheets to each other with side seam welds at 12 inches on center.

3.3 FIELD QUALITY CONTROL

- A. Tests: When required by the Architect and Resident Engineer, installation of metal decking and welding shall be subject to inspection by a qualified Testing Agency acceptable to Architect and Resident Engineer, the cost of which will be paid in accordance with requirements of Section 01 45 00.
- B. The Testing Agency shall:
 - 1. Test and inspect metal decking and workmanship to verify compliance with Contract Documents.
 - 2. Check material, equipment, procedures, welds, ability of welders.
 - 3. Furnish Architect and Resident Engineer with a verified report that completed Work conforms with Contract Documents.

3.4 CLEANING

- A. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of away from premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

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SECTION 05 50 00

METAL FABRICATIONS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Metal fabrications, including items fabricated from iron and steel shapes, plates, bars, strips, tubes, pipes and castings which are not a part of structural steel or other metal systems in other Sections of these Specifications. Types of metal items include, but are not limited to, the following:
1. Carpenter's ironwork.
 2. Steel pipe guards
 3. Steel pipe bollards.
 4. Ladders.
 5. Miscellaneous framing and supports.
 6. Miscellaneous steel trim.
 7. Coiling door jamb channel.
 8. Sign bracing.
 9. Flagpole bracing.
 10. Enclosure gates and hardware.
 11. Other items as indicated.
- B. Related Sections:
1. Section 32 31 19 - Ornamental Fences and Gates

1.2 SUBMITTALS

- A. Shop Drawings: Submit Drawings for the fabrication and erection of assemblies of items which are not completely shown by the Manufacturer's data sheets.
1. Include plans and elevations at not less than 1 inch to 1'-0" scale, and include details of sections and connections at not less than 3 inches to 1'-0" scale.
 2. Show anchorage and accessory items.
- B. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 QUALITY ASSURANCE

- A. Standards: Comply with the following, except as otherwise shown and specified:
1. AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings."
 2. AISI "Specifications for the Design of Cold-Formed Steel Structural Members."
 3. AWS "Structural Welding Code-Steel."
 4. ASTM A6 "General Requirements for Rolled Steel Plates Shapes, Sheet Piping and Bars for Structural Use."
- B. Qualifications: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure."

1.4 DELIVERY, STORAGE AND HANDLING

- A. Exercise care during unloading, storage and erection to avoid damage. Dumping on the ground is not permitted.
- B. Support material stored at the site completely free of the ground, and cover to avoid damage from the elements.

1.5 PROJECT/SITE CONDITIONS

- A. Field Measurements: Take field measurements prior to preparation of Shop Drawings and fabrication, where possible, to ensure proper fitting of the Work. Allow for trimming and fitting wherever the taking of field measurements before fabrication might delay the Work.

PART 2 PRODUCTS

2.1 MATERIALS

- A. General
 - 1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 - 2. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
- B. Wide Flange Steel Sections: ASTM A572 or A992 (Fy = 50ksi).
- C. Steel Shapes, Plates, Rod, Bars and Bar-size Shapes: ASTM A36. Thickness /gauge shall be as indicated on Drawings.
- D. Steel Tubing (Cold-formed Welded and Seamless): ASTM A500, Grade b (Fy = 46ksi).
- E. Steel Tubing (Hot Formed Welded and Seamless): ASTM A501, (Fy =36ksi).
- F. Cold-Finished Carbon Steel Bars: ASTM A108, Grade as selected by fabricator.
- G. Hot-rolled Carbon Steel Sheets and Strips: ASTM A568 and ASTM A569, pickled and oiled.
- H. Cold-rolled Carbon Steel Sheets: ASTM A611.
- I. Hot-dip Galvanized Steel Sheets: ASTM A653, with G90 zinc coating.
- J. Cold-drawn Steel Tubing: ASTM A512, sunk drawn, butt welded, cold-finished and stress-relieved.
- K. Steel Pipe: ASTM A53, type as selected; Grade A. Black finish unless galvanizing is required. Standard weight, Schedule 40, unless otherwise shown or specified.
- L. Anchors:
 - 1. Masonry Anchorage Devices: Expansion shield, FS FF-S-325.
 - 2. Toggle bolts: Tumble-wing type, FS FF-B-588; type, class and style as required.
 - 3. Chemical Type Anchors: 2-component chemically curing anchors for concrete or masonry construction, capsule or injection type, designed to accept manufacturer's galvanized anchor rod.

- M. Fasteners: Provide zinc-coated fasteners with galvanizing complying with ASTM A153 for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required for the installation of miscellaneous metal items.
1. Bolts and nuts: ASTM A307, Grade A, regular hexagon head.
 2. Bolts, hexagon and square: ANSI B-18.2.1.
 3. Bolts, round head: ANSI B-18.5.
 4. Lag bolts: Square head type.
 5. Wood screws: ANSI B-18.6.1, flat head carbon steel.
 6. Plain washers: ASTM F844 helical spring type carbon steel.
- N. Galvanizing: ASTM A123 for steel plates, bars and strips.
- O. Metal Primer: VOC compliant.
1. Interior Steel: Zinc oxide, alkyd primer, high-solids content, conforming to SSPC-Paint 25.1.
 2. Exterior Steel (exposed): 2-component, moisture-cured zinc-rich primer conforming to SSPC-PS 12.01.
 3. See also Section 09 91 00 for requirements regarding paints for compliance with LEED™ requirements.

2.2 ACCESSORIES

- A. Inserts and Anchorages: Furnish inserts and anchoring devices to be set in concrete or built into masonry for installation of Miscellaneous Metal Work. Provide setting Drawings, templates, instructions and directions for installation of anchorage devices.
- B. Concrete Fill (for concrete filled pipe bollards): Comply with requirements of Section 03 30 00 for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi.

2.3 FABRICATION

- A. General: For fabrication of Miscellaneous Metal Work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness. Remove such blemishes by grinding or by welding and grinding, prior to cleaning, treating and application of surface finishes, including zinc coatings.
- B. Shop Assembly: Preassemble items in shop, when possible, to minimize field splicing and assembly of units at the site. Disassemble units only to extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- C. Workmanship:
1. Use materials of the size and thickness shown, or if not shown, of the required size and thickness to produce adequate strength and durability of the finished product for the intended use. Work to the dimensions of fabrication and support. Use type of materials shown or specified for various components of Work.
 2. Form exposed Work true to line and level with accurate angles, surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32 inch unless otherwise shown. Form bent-metal corners to the smallest radius possible without causing grain separation or otherwise impairing the Work.
 3. Weld corners and seam continuously and in accordance with the recommendations of AWS. Grind exposed welds smooth and flush to match and blend with adjoining surfaces.

4. Form exposed connections with hairline joints which are flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of the type shown, or if not shown, use Phillips flat-head (countersunk) screws or bolts.
 5. Provide for anchorage of type shown, coordinated with supporting structure and the progress schedule. Fabricate as required to provide adequate support for the intended use of the Work.
 6. Cut, reinforce, drill and tap Miscellaneous Metal Work as may be required to receive finish hardware and similar items of Work.
 7. Use hot-rolled steel bars for Work fabricated from bar stock, unless Work is indicated to be fabricated from cold-rolled, or cold-finished stock.
- D. Carpenter's Iron Work:
1. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware are specified in Division 6 Sections.
 2. Manufacture or fabricate items of sizes, shapes and dimensions required. Furnish malleable iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.
- E. Ladders:
1. Fabricate ladders for the locations shown, with dimensions, spacings, details and anchorages as required. Comply with requirements of ANSI A14.3, except as otherwise shown.
 2. Fit rungs into punched holes in centerline of side rails, plug weld and grind smooth on outer rail faces.
 3. Support each ladder at top and bottom and at intermediate points spaced not more than 5 feet o.c. Use welded or bolted steel brackets, designed for adequate support and anchorage, and to hold the ladder 6 inches clear of the wall surface and other obstructing construction. Extend rails 42 inches above top rung, and return rails to wall or structure unless other secure handholds are provided. If the adjacent structure does not extend above the top rung, gooseneck the extended rails back to the structure to provide secure ladder access.
 4. Provide non-slip surfaces on the top of each rung, either by coating the rung with aluminum oxide granules set in epoxy resin adhesive, or by using a type of manufactured rung which is filled with aluminum oxide grout.
 5. Exterior ladders shall have hot-dipped galvanized finish.
- F. Coiling Door Jamb Channel: Channel shall be constructed from structural shapes and sizes indicated on drawings. All welds shall be continuous, tack welding shall not be permitted. Grind all welds smooth.
- G. Hose Drying Rack: Rack shall be constructed from structural shapes and sizes indicated on drawings. All welds shall be continuous, tack welding shall not be permitted. Grind all welds smooth.
- H. Hose Storage Rack: Rack shall be constructed from structural shapes and sizes indicated on drawings. All welds shall be continuous, tack welding shall not be permitted. Grind all welds smooth.
- I. Miscellaneous Framing and Supports:
1. Provide miscellaneous steel framing and supports which are not a part of the structural steel framework, as required to complete Work.

2. Fabricate miscellaneous units to sizes, shapes and profiles shown, or if not shown, of the dimensions required to receive adjacent grating, plates, doors or other Work to be retained by the framing. Except as otherwise shown, fabricate from structural steel shapes and plates and steel bars of all welded construction using mitered corners, welded brackets and splice plates, and a minimum number of joints for field connection. Cut, drill and tap units to receive hardware and similar items to be anchored to the Work.
 3. Equip units with integrally welded anchor straps for casting into concrete or building into masonry wherever possible. Furnish inserts if units must be installed after concrete is poured. Except as otherwise shown, space anchors 24 inches o.c., and provide minimum anchor units of 1-1/4 inch x 1/3 inch x 8 inch steel straps.
- J. Enclosures and Enclosure Gates: Fabricate to sizes and shapes indicated using galvanized steel tubing and shapes with skin as indicated on drawings and as detailed. Fabricate with continuously welded joints, and smooth exposed edges. Miter corners and use concealed field splices wherever possible.
1. Hinges: Provide heavy duty galvanized steel or aluminum butt hinges sized as required for weight of gate. Weld hinges to frame.
 2. Provide motor and all accessories required to power gates as called for on Drawings.
- K. Fabricate pipe bollards from steel pipe of diameter indicated on Drawings.
- L. Miscellaneous Steel Trim: Provide shapes and sizes as required for the profiles shown. Except as otherwise noted, fabricate units from structural steel shapes and plates and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings and anchorages as required for coordination of assembly and installation with other Work.

2.4 FINISHING

- A. Galvanizing: Comply with ASTM A123 and A153 for the hot-dip process after fabrication.
- B. Shop Painting:
1. Shop paint Miscellaneous Metal Work, except those members or portions of members to be embedded in concrete or masonry, surfaces and edges to be field welded, and galvanized surfaces, unless otherwise indicated.
 2. Remove scale, rust and other deleterious materials before shop coat of paint is applied. Clean in accordance with SSPC SP-2, SP-3, or SP-7, as required. Remove oil, grease and similar contaminants in accordance with SSPC SP-1.
 3. Apply one shop coat of metal primer paint to fabricated metal items, except apply 2 coats of paint to surfaces which are inaccessible after assembly or erection.
 4. Immediately after surface preparation, brush or spray on metal primer paint in accordance with Manufacturer's instructions, and to provide a uniform dry film thickness of 2 mils for each coat.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.

- B. Coordination: Coordinate with other Work which affects, connects with, or will be concealed by this Work.

3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete or embedded in masonry with setting templates to appropriate Trades.
- C. Set sleeves in concrete with tops flush with finish surface elevations. Protect sleeves from water and concrete entry.

3.3 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components indicated on Shop Drawings.
- D. Perform field welding in accordance with AWS D1.1.
- E. Install pipe bollards in concrete footings plumb and level, accurately fitted, free from distortion or defects. Provide adequate bracing as required to hold bollard in position until concrete has been placed and cured.
 - 1. Fill bollards solidly with concrete and mound top surface to shed water.
- F. Obtain Architect and Structural Engineer approval prior to site cutting or making adjustments not scheduled.
- G. Touch-up Painting: Touch-up welds, abrasions, and other areas where shop prime paint has been removed or is damaged with specified prime paint or galvanizing repair paint.

3.4 ERECTION TOLERANCES

- A. Maximum Variation from Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset from True Alignment: 1/4 inch

3.5 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

SECTION 05 51 00

STEEL STAIRS

PART 1 GENERAL

1.1 SYSTEM DESCRIPTION

- A. Design Requirements: Steel stairs including stringers, treads (with concrete fill), risers and landings (with concrete fill), shall be designed and fabricated to support dead load plus live load of 100 psf or a concentrated load of 300 pounds, whichever governs. Limit maximum live load deflection to 1/360 span.
- B. Work performed under this section shall be a deferred submittal in accordance with Structural Notes on the structural drawings.

1.2 SUBMITTALS

- A. Shop Drawings: Submit Drawings showing dimensions, details and erection diagrams. Shop drawings shall be sealed by a Structural Engineer registered in the State of California.
- B. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with local code and regulatory agency requirements for stair design and the following:
 - 1. ANSI A117.1, 2003 "Accessible and Usable Buildings and Facilities."
 - 2. Public Law 101-336 "The Americans with Disabilities Act of 1990 (ADA)."
 - 3. ADA Accessibility Guidelines (ADAAG).
- B. Welding: Conforming to AWS D1.1 and performed by certified welders.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Exercise care during unloading, storage and erection to avoid damage. Dumping on the ground is not permitted.
- B. Support material stored at the site completely free of the ground, and cover to avoid damage from the elements.

1.5 PROJECT/SITE CONDITIONS

- A. Field Measurements: Verify existing conditions by taking field measurements.

PART 2 PRODUCTS

2.1 MATERIALS

- A. General
 - 1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 - 2. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
- B. Structural Steel Shapes, Plates, Bars and Bar-Size Shapes: ASTM A572 or A992 (Fy = 50ksi).
- C. Steel Tubing: ASTM A500, Grade B (Fy = 46 ksi).
- D. Steel Pipe: ASTM A53.
- E. Structural Steel Sheet: ASTM A569 or ASTM A570, Grade 30
- F. Concrete Fill for Metal Pan Treads: 3,000 psi 28 day compressive strength regular weight concrete complying with Section 03 30 00.
- G. Metal Primer: VOC compliant.
 - 1. Interior Steel: Tnemec FD88-559 Gray www.tnemec.com.
 - 2. Exterior Steel: Tnemec Tneme-Zinc 90-97 (organic).
 - 3. See also Section 09 91 00 for requirements regarding paints for compliance with LEED™ requirements.

2.2 FABRICATION

- A. Fabrication, General:
 - 1. Conform to Standard Specifications, Rules and Practice of the AISC as described in the "Steel Construction Manual"
 - 2. Form and fabricate the Work to meet installation requirements.
 - 3. Include accessories to adequately secure the Work in place.
- B. Shop fabricate metal stairs to designs and configurations indicated on Drawings and to comply with the "Recommended Voluntary Standards for Fixed Metal Stairs" of NAAMM (National Association of Architectural Metal Manufacturers) Standard AMP 510 "Metal Stairs Manual" for Commercial Classification of stairs, except where more stringent requirements are specified:
- C. Metal Pan Units:
 - 1. Form metal pans of 12 gage thick structural steel sheet.
 - 2. Shape pans to conform to configurations shown.
 - 3. Construct riser and subtread metal pans with steel angle or bars supporting brackets, of size shown, welded to stringers.
 - 4. Secure metal pans to brackets with welds, as shown.
 - 5. Secure subplatform metal pans to platform frames with welds.
- D. Fabricate stringers of structural steel shapes as shown. Provide closures for exposed ends of stringers and interior pans.
- E. Provide metal framing, hangers, columns, struts, clips, brackets, bearing plates and other components as required for support of stairs and platforms.

- G. Shop/Factory/Finishing: Clean metal work of grease, rust, mill scale and other foreign matter, and give a coat of primer.
- H. Galvanizing: ASTM A653, Class G-60. Prepare galvanized surfaces as required to receive paint finish.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other work which affects, connects with, or will be concealed by this Work.

3.2 PREPARATION

- A. Where masonry walls support the Steel Stair Work, provide temporary supporting struts, designed for the erection of steel stair components before installation of masonry.

3.3 ERECTION

- A. Make connections between members, unless otherwise indicated, by the use of welds or bolts.
- B. Conceal connections in finished Work where possible.
- C. Accurately align members for miter exposed joints with hairline joints.
- D. Perform welding by the shielded arc method.
- E. Grind welds in finished surfaces smooth with no identifying marks remaining exposed.
- F. Fabricate units so that bolts and other fastenings do not appear on finish surfaces. Make joints true and tight.
- G. Touch-Up Painting:
 - 1. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
 - 2. Remove temporary guys, bracing and bracing clips. Grind flush remaining burrs before painting. Remove welding slag, splatter, rust and burnt paint and clean welds by wire brushing before touch-up.

3.4 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises.
- B. Construction Waste: In accordance with Section 01 74 19.

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SECTION 05 52 00

HANDRAILS AND RAILINGS

PART 1 GENERAL

1.1 SYSTEM DESCRIPTION

- A. Structural performance of handrails and railing systems: Comply with ASTM E985 based on testing in accordance with ASTM E894, ASTM E935 and IBC Section 1607.7.
 - 1. Guardrails and handrails shall meet or exceed all applicable building codes.
 - 2. Railings shall have high strength steel to comply with structural requirements with an appropriate safety margin.
 - 3. Internal members shall be stainless steel or aluminum to eliminate the possibility of rust.
 - 4. Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
- B. Design Requirements: Comply with ASTM E985 and IBC Section 1006 and Section 16.
- C. Thermal Movements: Provide handrails and railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, over stressing of components, 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.
- D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.2 SUBMITTALS

- A. Shop Drawings: Submit Drawings showing dimensions, details and erection diagrams, connections with other work, and calculations sealed by a qualified Structural Engineer registered in the State where the Project is located, certifying conformance with Code and Performance Requirements.
- B. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with local code and regulatory agency requirements for handrail and railing design and the following:
 - 1. ANSI A117.1, 1998 "Accessible and Usable Buildings and Facilities."
 - 2. Public Law 101-336 "The Americans with Disabilities Act of 1990 (ADA)."
 - 3. ADA Accessibility Guidelines (ADAAG).
- B. Welding: Conforming to AWS D1.1 and performed by certified welders.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in manufacturer's original unopened packaging with labels intact. Protect finished surfaces with removable wrapping or coating which will not bond when exposed to sunlight.
- B. Storage: Adequately protect against damage while stored at the site.
- C. Handling: Comply with manufacturer's instructions.

1.5 PROJECT/SITE CONDITIONS

- A. Field Measurements: Verify existing conditions by taking field measurements.

PART 2 PRODUCTS

2.1 MATERIALS

- A. General
 - 1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 - 2. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
- B. Structural Steel Shapes, Plates, Bars and Bar-size Shapes: ASTM A572 or A992 (Fy = 50ksi).
- C. Steel Tubing: ASTM A500, Grade B (Fy = 46ksi).
- D. Gray Iron Castings: ASTM A48, Class 30.
- E. Malleable Iron Castings: ASTM A47, Grade as selected.
- F. Steel Pipe: ASTM A53, type as selected, Grade A standard weight (Schedule 40).
- G. Wire Rope (Cable Railing):
 - 1. Cable: ASTM A475 or ASTM A363, extra-high strength grade, zinc coated steel, prestretched, 1 x 19 structural multiple wire rope..
 - 3. Nominal Diameter: 3/8-inch, unless otherwise indicated.
 - 4. Termination Studs, Turnbuckles and Fittings: Provide Type 316 stainless steel turnbuckles and fittings of the style selected by Architect and Resident Engineer. Provide turnbuckles and fittings capable of sustaining loads equal to or greater than wire rope being connected, without failure.
 - a. Acceptable Manufacturers:
 - 1) Feeney Wire Rope and Rigging, Oakland, CA www.feeneywire.com
 - 2) Hayn Enterprises, LL, Rocky Hills, CT www.hayne.com
 - 3) C. Sherman Johnson Co., Inc., East Haddam, CT www.csjohnson.com
 - 4) Or equal
 - b. Products:
 - 1) CableRail Quick-Connect Jaw Turnbuckle as manufactured by Feeney, or equal.
 - 2) CableRail Quick-Connect Fixed Jaw End as manufactured by Feeney, or equal.

- H. Metal Primer: VOC compliant.
 - 1. Interior Steel: Tnemec FD88-559 Gray www.tnemec.com or equal.
 - 2. Exterior Steel: Tnemec Tneme-Zinc 90-97 (organic) or equal.
 - 3. See also Section 09 91 00 for requirements regarding paints for compliance with LEED™ requirements.
- I. Anchoring Cement: Prepackaged, erosion-resistant, non-shrink hydraulic controlled anchoring cement recommended for exterior use.
- J. Nonshrink, Nonmetallic Grout: Prepackaged, non-shrink, nonstaining grout complying with ASTM C 1107 and recommended for interior and exterior use as applicable.

2.2 FABRICATION

- A. Shop Assembly:
 - 1. Conform with AISC Standard Specifications, Rules and Practice in the "Steel Construction Manual."
 - 2. Preassemble items in shop to the greatest extent possible to largest practicable sizes to minimize field splicing/welding and assembly of units at the site.
 - 3. Limit size of shop assembled units only to extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
 - 4. Form and fabricate the Work to meet installation conditions.
 - 5. Include accessories to adequately secure the Work in place.
 - 6. Make provisions to connect with or to receive abutting construction.
- B. Shop/Factory/Finishing: Clean surfaces of grease, rust, mill scale, and other foreign matter, and apply coat of primer.
- C. Make connections between members, unless otherwise indicated by welding.
 - 1. Cope and cut components for hairline fit prior to welding.
 - 2. Accurately align members.
 - 3. Fabricate joints watertight for exterior applications.
 - 4. Welds shall be flush type, with fillets dressed to uniform radius, using the shielded arc method.
 - 5. Make provisions to allow for thermal expansion of handrails and railings.
- D. Where bolted or screw connections are indicated or necessary, use round or oval head bolts and tamper-resistant screws and conceal in the finished work to the greatest extent possible.
- E. Provide metal end caps at exposed or open end conditions.
- F. Grind welds, projections and corners in finished surfaces smooth. No identifying marks shall remain exposed.
- G. Wire Rope and Fittings: Fabricate wire rope intermediate rails from galvanized wire rope, termination studs, turnbuckles and fittings as detailed on drawings.
 - 1. Provide wire rope in continuous lengths for each railing section.
 - 2. Cut wire rope to necessary lengths to allow proper tensioning of installed rope section between supporting end terminations.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other work which affects, connects with, or will be concealed by this Work.

3.2 INSTALLATION

- A. Install steel railings and handrails at locations indicated.
- B. Install items anchored in concrete in the formwork, where practicable.
- C. Install items to be built into masonry so masonry can be built up to them.
- D. Where indicated, anchor posts in concrete with core drilled holes or pre-set sleeves of diameter at least 3/4" more than diameter of post being anchored and not less than 5" deep. Fill space with non-shrink, non-metallic grout or anchoring cement.
- E. Install posts and vertical members plumb within 1/8 inch of vertical. Install longitudinal members parallel with each other and to floor surfaces or slope of stairs to within 1/8 inch per 10 running feet.
- F. Securely anchor wall brackets.
- G. Cables: Install parallel and taut, anchored to supporting posts and end termination as detailed on Drawings and approved Shot Drawings.
 - 1. Install wire rope in continuous lengths for each railing section.
 - 2. Tension each section between supporting end terminations, without sag.
 - 3. Re-tension installed wire rope sections as necessary after initial relaxation of rope and just before final occupancy of Project.

3.3 CLEANING

- A. During the course of the Work and on completion of the Work, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

SECTION 05 70 00
ORNAMENTAL METALWORK

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Stainless steel kitchen countertops
 2. Stainless steel wall surface adjacent to the range cooking surfaces, including sides of cabinets.
 3. Miscellaneous interior ornamental metalwork.

1.2 QUALITY ASSURANCE

- A. Subcontractor qualifications: Fabricate and install the work of this Section using a subcontractor having a minimum of 2 years experience in this type of work. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance and desired aesthetic affect of the work of this Section.
- B. Reference standards: Except as modified by governing codes and by the Contract Documents, comply with the applicable provisions and recommendations of the following.
1. NAAMM Metal Finishes Manual
 2. AWS Structural Welding Code
- C. Exposed ornamental and sheet metal and mockups of typical conditions, colors of sealants, coordination with adjacent/adjoining materials to be site approved by Architect and Resident Engineer.
1. Where appropriate, Architect and Resident Engineer will provide reviews at factory/fabrication site and final approval at Building Site.
 2. Metals shall be installed to ensure minimal surface deformation/deflection and shall be free of staining.
- D. Pre-Installation / Pre-construction Conference: Contractor shall schedule a meeting with the Architect and Resident Engineer at the jobsite prior to construction of ornamental metal items to review the work to be provided. The purpose of the meeting will be to review the level of quality of work to be provided and to determine a schedule of inspections for attachments, installation and other critical stages of the construction.

1.3 SUBMITTALS

- A. Shop Drawings:
1. Submit Shop Drawings of proposed work of this Section.
 2. Include plans, sections and elevations at not less than 1/4" to 1/2" scale, and include details of connections at full size.
 3. Exterior cladding: Submit drawings showing layouts, sizes, gauges, methods of construction and installation, including sizes and types of fastening devices, and other details as necessary to erect a weather tight assembly.
- B. Product Data: Submit product data for proprietary items used.

- C. Samples: Sample panels or representative shapes of ornamental items, showing proposed metal finishes to be used in this Section, for approval of finishes. For stainless steel channel construction, provide samples of finish and attachment details.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in manufacturer's original unopened packaging with labels intact.
- B. Storage: Store off ground and under cover, protected from damage.
- C. Handling:
 - 1. Handle materials so that surfaces are protected.
 - 2. Prevent distortion or damage to fabricated pieces.
 - 3. Handle stainless steel and galvanized metal which will be exposed in the completed work with gloved hands to prevent skin oils from staining surface. Protect galvanized finish from machine and other oils which will discolor surface. Stainless steel and galvanized finishes are to be unstained in the final work.

1.5 PROJECT CONDITIONS

- A. Measurements: Verify dimensions by taking field measurements; proper fit and attachment of items is required.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Stainless steel:
 - 1. Tubing and pipe: ASTM A269 and ASTM A312, seamless, and unless indicated otherwise on Drawings, required by design, or directed by Owner, provide Type 304 with minimum wall thickness equivalent to Schedule 40.
 - 2. Plate, sheet, and strip:
 - a. ASTM A167 and unless indicated otherwise on Drawings, required by design, or directed by Owner, provide Type 304.
 - b. Stainless steel wall surface adjacent to range cooking surface: 22 gauge.
 - 3. Castings: ASTM A743 and unless indicated otherwise on Drawings, required by design, or directed by Owner, provide Grade CF-8.
 - 4. Finish: No. 4 unless noted otherwise indicated on Drawings.
- B. Fasteners: Unless otherwise noted on drawings and details, provide the following.
 - 1. Stainless steel Type 300 series, selected to prevent galvanic action with the components fastened.
 - 2. Where exposed in finished surfaces, use oval-head countersunk cross-headed screws with head diameter one (1) screw size smaller than the shank diameter, finished to match adjacent surfaces.

2.2 ACCESSORY MATERIALS

- A. Supporting framework: In accordance with Section 05 41 00 – Structural Metal Stud Framing or Section 09 22 16 – Metal Support Assemblies as applicable. Provide 2 inch deep channels unless otherwise noted on Drawings.

2.3 FABRICATION

- A. General: Fit and assemble work in the shop as far as practicable.
- B. Design and fabricate ornamental and artistic metalwork to conform to approved Shop Drawings and Artists Renderings to designs, sizes, shapes, patterns and configurations shown with type of metals indicated. Hand-forge and/or provide whatever other special techniques and methods required to achieve the artistic intent and type finish desired for the work.
- C. Fabricate items with concealed attachments for connecting to other work, unless otherwise indicated.
- D. Shop weld or braze all joints in the shop to the greatest extent possible to comply with AWS recommended practices.
- E. Joints: Carefully fit and match work with continuity of line and design, using rigidly secured joints with hairline contact, unless otherwise indicated. Reinforce members and joints with plates, bar, rods or angles for rigidity and strength as needed to fulfill performance requirements. Use concealed non-ferrous metal fasteners for jointing which cannot be welded. Where exposed fasteners are unavoidable in the finished work provide Phillips flat-head machine screws countersunk flush with the adjoining surface, unless other fasteners indicated or detailed.
- F. Finishes: Provide with finish in accord with NAAMM AMP501 to match approved samples

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions:
 - 1. Examine the areas and conditions under which the work of this Section will be performed and report detrimental conditions in writing to Architect and Resident Engineer.
 - 2. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
 - 3. Commencement of Work will be construed as acceptance of subsurfaces.
 - 4. Examine alignment of support members before installing ornamental metalwork. Do not proceed with such installation if the members are not aligned to the tolerances required by ornamental metalwork Manufacturer.
- B. Coordination: Coordinate with other work which affects, connects with, or will be concealed by this Work.

3.2 PREPARATION

- A. Field measurements: Verify dimensions before proceeding with the Work. Obtain field measurements for work required to be accurately fitted to other construction. Be responsible for the accuracy of such measurements and precise fitting and assembly of finished work.

3.3 INSTALLATION

- A. Coordination: Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section. Coordinate schedules for installation of the work of this Section with schedules for other installations to assure orderly progress of the total construction sequence.
- B. Cut, drill, and fit ornamental metal work and trim as required for installation. Do not cut or abrade finishes that cannot be restored in the field. Stainless Steel shall be passivated after all cutting and forming to assure against rust spotting.
- C. Install items accurately placed in location, plumb, level and in alignment and elevation with adjoining work. Fit field connections accurately together to form hairline joints.
- D. Install countertops, cladding, panels, fasteners, trim, and accessories in accordance with manufacturer's instructions and as indicated on Drawings.
 - 1. Make cuts, bends, punching and drilling accurate, neat and properly located.
 - 2. Use concealed fasteners.
 - 3. Grind and file smooth parts exposed to view; leave exposed surfaces free of fabrication marks. Make members true to length to allow assembly without fillers.
 - 4. Provide holes and connections as required for other trades.
 - 5. Install cladding plumb and true and in proper alignment and relation to wall framing.
 - 6. Repair or replace, as directed, panels and trim which have been damaged.
- E. Brazed Connections: Connect joints by brazing to comply with applicable AWS specifications.
- F. Attachment: Fasten metal work to solid masonry with expansion bolts or with fiber plugs and to hollow block with toggle bolts. Provide screws threaded full length to the head of the screw.
- G. Install vertical members plumb within 1/8 inch of vertical. Install longitudinal members parallel with each other and to floor surfaces to within 1/8 inch per 10 running feet.

3.4 CLEANING

- A. Upon completion of this portion of the Work, promptly clean exposed portions and remove traces of dirt, grease and foreign materials.
- B. Construction Waste: In accordance with Section 01 74 19.

3.5 DAMAGE AND REPAIR

- A. Upon completion of the installation, visually check exposed surfaces of the work of this Section, and touch up scratches and abrasives to be completely invisible to the unaided eye from a distance of five feet.
- B. Stained metal surfaces which are visible in the final work shall be removed and replaced with new, unstained materials.

END OF SECTION

SECTION 06 10 53

MISCELLANEOUS CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Rough carpentry including, but not limited to:
 - 1. Plywood telephone and electrical backer boards
 - 2. Miscellaneous backing, blocking, nailers and curbs.
 - 3. Treated exterior grade plywood to be buried for blindside waterproofing as specified in Section 07 17 16 - Bentonite/HDPE Sheet Waterproofing.

1.2 SUBMITTALS

- A. Product Data: Submit technical data for wood preservative and fire retardant products.
- B. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 QUALITY ASSURANCE

- A. Identify each piece of lumber or plywood used for structural framing with grade and trade mark of a lumber grading organization. Trade mark of manufacturer shall also appear on each piece.
- B. Grading Rules: Conform with applicable requirements of American Lumber Standards "Simplified Practice Recommendation R-16" and to grading rules of manufacturer's association under whose rules the lumber is produced.
- C. Standards: Conform with requirements of American Plywood Association, U. S. Dept. of Commerce Commercial Standards and American Wood Preservers Association Standards, as they apply.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in manufacturer's original unopened packaging with labels intact.
- B. Storage: Store off ground to assure adequate ventilation, and protect against damage while stored at the site.
- C. Handling: Comply with manufacturer's instructions.

1.5 PROJECT CONDITIONS

- A. Physical Requirements for Proper Installation or Application: Store materials for which a maximum moisture is specified in areas where humidity can be controlled.

PART 2 PRODUCTS

2.1 MATERIALS AND ACCESSORIES - GENERAL

- A. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
- B. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
- C. See requirements for wood and agrifiber products specified in Section 01 60 00 to comply with LEED EQ Credit 4.4

2.2 LUMBER MATERIALS

- A. Species: Douglas Fir – Larch, Hem Fir graded in accordance with Standard Grading and Dressing Rules of WCLIB. Framing lumber shall be stress grade. All sides shall be surfaced.
- B. Lumber Grades: As follows unless noted differently on the Drawings:
 - 1. Misc. blocking, bridging, etc: Utility.
 - 2. Grounds and furring: Construction Grade Douglas Fire or No. 2 White Pine.
- C. Moisture Content:
 - 1. Lumber shall be air-dried or kiln-dried.
 - 2. At time of installation, moisture content, expressed as a percentage of the weight of the oven-dry wood, shall not exceed 19 percent for lumber of up to two inches nominal thickness and 15 percent for exterior trim and siding.
 - 3. Moisture content of lumber over two inches nominal thickness shall conform to the rules of the association under which it is graded.

2.3 SHEATHING MATERIALS

- A. Plywood Backing Panels: Grade C-D Exposure 1 plywood panels unless otherwise indicated.
 - 1. For mounting of telephone and electrical equipment: 15/16 inch thick plywood, unless otherwise indicated.
 - 2. Work out Room:
 - a. Walls shall be backed with minimum 1/2 inch thick plywood, unless otherwise indicated.
 - b. Provide backing for mount weight equipment. If plywood backing is insufficient to support the equipment (and user), provide lumber as specified herein or miscellaneous metal as specified in Section 05 50 00.
 - 3. Tel./Communications Room: 3/4 inch plywood.

2.4 FACTORY WOOD TREATMENT

- A. Preservative Treatment:
 - 1. Materials:
 - a. Chromated copper arsenate (CCA) shall not be allowed.
 - b. Provide ammoniacal copper quaternary (ACQ) or copper boron azole (CBA) as produced by the following manufacturers:
 - 1) Arch Wood Protection, Inc., Smyrna, GA (866) 789-4567, www.wolmanizedwood.com or www.naturalselect.com.

- 2) Chemical Specialties, Inc., Charlotte, NC (800) 421-8661, www.treatedwood.com
 - 3) Osmose, Inc., Wood Preserving Division, Griffin, GA (800) 241-0240, www.osmose.com.
 - 4) Or equal.
2. Locations Required:
- a. Wood sillplates and ledgers bolted in direct contact with concrete or masonry, located at or below grade only shall be pressure treated lumber.
 - b. Blocking occurring on top of or above the roof deck, including the nailer beneath the flashing at parapet caps, shall be treated lumber.
 - c. Buried for blindside waterproofing as specified in Section 07 17 16 - Bentonite/HDPE Sheet Waterproofing as detailed at elevator pit.
 - d. Other locations as required by Code.
- B. Fire-Retardant Treatment: Hickson Corp. Dricon FRTW or equal in accordance with UL label.
1. Where required by code, wood studs, plates, sheathing, blocking, etc. shall be pressure treated.
 2. Dimensioned lumber shall be kiln dried to a maximum moisture content of 18 percent before and after milling and fire protective treatment.

2.5 ACCESSORIES

- A. Nails: Common wire, galvanized for exterior Work, meeting ASTM F1667 of the sizes indicated on the Drawings.
- B. Screws: Standard domestic manufacture, bright steel, except galvanized for exterior use and of brass, bronze, aluminum or stainless steel when used to attach items made of those materials. Screws used for attaching interior trim and finish to drywall partitions shall be Type S self-drilling, self-tapping corrosion resistant coated steel drywall screws of required lengths as specified in Section 09 29 00.
1. Screws used for attaching preservative treated wood shall be Type S self-drilling, self-tapping corrosion resistant coated steel screws. Acceptable products include the following:
 - a. DEC-KING Exterior Wood Screw with Climacoat.
 - b. Tapcon Concrete Anchor with Blue Climaseal or White UltraShield.
 - c. Wood-To-Metal TEKS with Grey Spex.
 - d. Roofgrip with Spex or Blue Climaseal.
 - e. GY-FAST Nail with Climacoat.
 - f. Maxi-Set Tapcon White UltraShield.
 - g. Or equal.
- C. Bolts: Standard mild steel, square head machine bolts with square nuts and malleable iron or steel plate washers or carriage bolts with square nuts and cut washers as indicated. Bolts, nuts and washers, wholly or partially exposed on exterior shall be galvanized.
- D. Lag screws, shear plates and split ring connectors: Conform to requirements of the "National Design Specifications for Stress Grade Lumber and its Fastenings" of National Forest Products Association.
- E. Power driven inserts: Ramset, or equal, as approved by Structural Engineer through Architect and Resident Engineer meeting FS GGG-D-777a. Install as per manufacturer's printed directions. Charge shall be powerful enough to prevent spalling of concrete.

- F. Galvanizing: ASTM A653.
- G. Toggle Bolts: FS FF-B-588.
- H. Field Applied Adhesives: In accordance with the low-emitting materials requirements of Section 01 60 00 - Materials and Equipment.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Wood Backing:
 - 1. Provide wood backing, furring, stripping or blocking indicated or required for installation and attachment of work of other trades.
 - 2. Provide fire-proofed wood backing approved by Building Official where required by Code in noncombustible or fire-rated construction.
 - 3. Tel./Communications Room: One 10'-0" wall and one 4'-6" wall shall be covered with plywood, beginning 3'-0" off the floor and extending to 7'-0".
- B. Exterior base plates or sills resting on concrete: Bed in cement mortar to obtain a continuous bearing. Mortar shall consist of one part cement to three parts sand. Mix mortar in small quantities so that it can be used promptly. Size plates or sills and set level and true to line. Bolt down with bolts of size, length and spacing indicated with a bolt not more than 9 inches from the end of any piece.
- C. At roofs: Provide crickets, cants, equipment curbs, wood saddles, cant strips, curbs for plywood at parapet walls; other miscellaneous backing, blocking, curbing, and wood nailers bolted to tops of concrete, as specified or required.
- D. Plywood Backing Panels: Install with the "C" or best face on exposed side.
- E. Connections: Subdrill where necessary to avoid splitting.
- F. Bolts: Drill bolt holes 1/32 inch larger than bolt diameter. Use square plate or malleable iron washers under heads and nut where they bear against wood. Re-tighten bolts immediately prior to concealing with finish materials. Re-tighten exposed bolts immediately prior to final inspection by Building Official.
- E. Lag Screws and Screws: Subdrill, use square plate or malleable iron washer under lag screw heads when they bear on wood.

3.2 CLEANING

- A. During the course of the Work and on completion, remove excess materials, equipment and debris and dispose of away from premises.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

SECTION 06 20 00
FINISH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Finish carpentry as noted on Drawings.

1.2 SUBMITTALS

- A. Samples: When requested by Architect and Resident Engineer, submit two samples of each species of exposed wood to receive transparent finish at the site. Samples shall be 12 inches by 12 inches in size.
- B. Shop Drawings: Indicate materials, components profiles, fastening methods, jointing details and accessories to a minimum scale of 1-1/2 inch to 1'-0".
- C. Product Data: Provide data on fire retardant treatment materials and application instructions
- D. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.2 REFERENCES

- A. Reference Standards: Following standards apply to Work of this Section except where more stringent requirements are specified:
1. Architectural Woodwork Standards (AWS), Edition 1.
 2. American Wood Preservers Association (AWPA).
 3. Hardwood Plywood & Veneer Association (HPVA)
 4. National Hardwood Lumber Association (NHLA)

1.3 QUALITY ASSURANCE

- A. Applicable Standard: Perform work in accordance with AWI Architectural Woodwork Standards (AWS), Edition 1.
1. Provide Custom when not otherwise indicated.
 2. Affix Quality Grade Stamp to each unit of product (e.g. each case; each panel; each bundle of trim, etc.).
- B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum of 2 year documented experience.

- C. Regulatory Requirements:
1. Flame Spread Index: Where fire-retardant treated wood is specified or required by Code requirements, provide materials that have been tested in accordance with ASTM E84 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 2. Fire-retardant treated materials shall be identified with appropriate classification markings indicating rating on surfaces that will be concealed from view in the finished work or by separate removable label applied by the treated wood manufacturer.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact. Protect finished surfaces with removable wrapping or coating which will not bond when exposed to sunlight.
- B. Storage: Adequately protect against damage while stored at the site.

1.5 PROJECT CONDITIONS

- A. Physical Requirements for Proper Installation or Application: Provide humidity conditions which will not damage woodwork.
- B. Measurements: Verify dimensions shown on Drawings by taking field measurement; proper fit and attachment of parts is required.

PART 2 PRODUCTS

2.1 MATERIALS

- A. General
1. Recycled Content:
 1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 2. Architectural Woodwork: Minimum 50% pre-consumer recycled content.
 2. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
 3. Wood and agrifiber products must contain no added urea-formaldehyde resins in accordance with the requirements of "Low Emitting Materials" as specified in Section 01 60 00.
- B. Softwood Lumber: Graded in accordance with applicable standard specified herein under "Quality Assurance," for grade of work specified, Douglas Fir species, plain sawn, moisture content of 6-8 percent, with flat grain, of quality suitable for transparent finish. Thicknesses as indicated on Drawings.
- C. Softwood Plywood: Graded in accordance with applicable standard specified herein under "Quality Assurance," for grade of work specified, Baltic or marine ply face species, rotary cut, APA Marine Grade glue, sanded finish. Thicknesses as indicated on Drawings. Wood and agrifiber products must contain no added urea-formaldehyde resins in accordance with the requirements of "Low Emitting Materials" as specified in Section 01 60 00 - Materials and Equipment.

- D. Hardwood Plywood: HPVA HP Graded in accordance with applicable standard specified herein under "Quality Assurance," for grade of work specified, veneer core, APA Marine Grade glue, face species and cut as indicated on Drawings. Thicknesses as indicated on Drawings. Wood and agrifiber products must contain no added urea-formaldehyde resins in accordance with the requirements of "Low Emitting Materials" as specified in Section 01 60 00 - Materials and Equipment.
- E. Wood Particleboard: Not used.
- F. Hardboard: Not used.
- G. Base, Moldings, Door Jambs, Door Casing, Window Sills, Case Openings, ChairRail:
 - 1. Wet conditions including toilet rooms unless noted otherwise: Paint Finish, AWI Grade III and Better Select Fir, Maple, Poplar or Pine.
 - 2. Chair rail at interior corridor at Wainscot: Paint Finish, AWI Grade III and Better Select Fir, Maple, Poplar or Pine.
- H. Grounds, Blocking and Furring Strips: #2 White Pine, construction grade Douglas Fir or other sound softwood. Fire treated lumber as required by codes or construction type.
- I. Shelving: Douglas Fir, surfaced (S4S).
- J. Plastic Laminate: As specified in Section 06 40 00.
- K. Fasteners:
 - 1. Size and type: To suit application, galvanized finish in concealed locations and stainless steel finish in exposed locations.
 - 2. Concealed joint fasteners: Threaded steel.
- L. Shelf and Rod Supports: Knappe and Vogt Mfg. Co. No. 1195. www.knappeandvogt.com or approved equal.
- M. Shelf Standards and Supports: Knappe and Vogt #255 and #256, or #87 and #187 or approved equal. Finish to be selected by Architect and Resident Engineer.
- N. Wood Treatment Processes - Fire Retardant: Chemically treated and pressure impregnated; capable of providing flame spread/smoke developed ratings required by Building Code in accordance with ASTM E84.
- O. Adhesives: Solvent free, zero VOC, nonflammable, nontoxic and acceptable to Architect and Resident Engineer for application as required by Section 01 60 00. Titebond Solvent-Free Construction Adhesive as manufactured by Franklin International, Columbus, OH (800) 877-4583 www.titebond.com or equal is an acceptable product.

2.2 FABRICATION

- A. Fabrication shall be in accordance with applicable standard specified herein under "Quality Assurance," for grade of work specified.
- B. Shop assemble finish carpentry, when possible, for delivery to site in units easily handled and to permit passage through building openings.
- C. Shop prepare and identify components for matching during site erection.
- D. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- E. Plastic Laminate:
 - 1. Apply plastic laminate finish in full, uninterrupted sheets consistent with manufactured sizes.
 - 2. Fabricate components so that corners and joints hairline will have hairline fit; for attachment with concealed fasteners.
 - 3. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.

2.3 SHOP FINISHING:

- A. Sand work smooth and set exposed nails and other fasteners.
- B. Apply wood filler in exposed nail and fastener indentations. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and types recommended for applied finishes.
- C. Finish work in the factory in accordance with finish system #2 in accordance with AWI Architectural Woodwork Standards, Section 5 - "Finishing."
- D. Seal surfaces in contact with cementitious materials.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.2 PREPARATION

- A. Priming: Back-prime wood surfaces inaccessible and unexposed after installation before delivery with an approved linseed oil and aluminum primer. Prime coat unfinished metal parts prior to installation.

3.3 INSTALLATION

- A. Installation shall be in accordance with applicable standard specified herein under "Quality Assurance," for grade of work specified.
- B. Set and secure materials and components in place, plumb and level.

- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
- D. Use only hot-dip galvanized or aluminum finish or casing nails. Set nails for putty stopping in surfaced members. Hammer marks not acceptable on exposed finished surface and are subject to rejection of member by Architect and Resident Engineer.
- E. Make end splices exposed in finished members bevel splices and not square butted. Install members in as long lengths as possible.
- F. Provide and install other miscellaneous millwork items and related items required to complete the Work.
- G. Prepare woodwork installed by cleaning and sanding as required to receive finishes specified in Section 09 91 00.

3.4 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

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SECTION 06 40 00

ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.1 SUBMITTALS

- A. Shop Drawings: Submit Drawings showing layout, elevations, dimensions, hardware, construction details, and schedule of finishes.
- B. Samples:
 - 1. Submit two 12 inch x 12 inch samples of each wood species to receive transparent finish at job site and at mill.
 - 2. Submit two 6 inch x 6 inch samples of type or color of plastic laminate.
- C. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.2 REFERENCES

- A. Reference Standards: Following standards apply to Work of this Section except where more stringent requirements are specified:
 - 1. Architectural Woodwork Standards, Edition 1, 2009, adopted and published jointly by AWI, AWMAC and WI.
 - 2. ANSI/NEMA LD3 for laminates.

1.3 QUALITY ASSURANCES

- A. Applicable Standard: Perform work in accordance with Architectural Woodwork Standards, Edition 1, 2009, adopted and published jointly by AWI, AWMAC and WI (formerly Woodwork Institute of California – WIC). Provide Custom when not otherwise indicated.
- B. Qualifications: Manufacturer shall be company specializing in manufacturing the products specified in this Section with minimum 2 years documented experience.
- C. Mock-up: Provide mock-up of full size base cabinet and upper cabinet for approval.
 - 1. Provide units with specified counter top, with hardware installed.
 - 2. Units will be examined to ascertain quality and conformity to quality level standards and Specification requirements.
 - 3. Mock-up may remain as part of the Work, if accepted by the Architect.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Storage: Adequately protect against damage and moisture while stored at the site.
- C. Handling: Comply with Manufacturer's instructions.

1.5 PROJECT CONDITIONS

- A. Physical Requirements for Proper Installation or Application: Provide humidity conditions which will prevent damage to woodwork.
- B. Verify that field measurements are as indicated on Shop Drawings.

PART 2 PRODUCTS

2.1 MANUFACTURERS - PLASTIC LAMINATE

- A. Furnish plastic products of one of the following Manufacturers, except as approved by the Architect, subject to compliance with Specification requirements:
 - 1. Wilsonart www.wilsonart.com
 - 2. Formica www.formica.com
 - 3. Nevamar www.nevamar.com
 - 4. Laminart www.laminart.com
 - 5. Pionite www.pionite.com

2.2 MATERIALS AND ACCESSORIES – GENERAL

- A. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
- B. Wood and agrifiber products must contain no added urea-formaldehyde resins in accordance with the requirements of "Low Emitting Materials" as specified in Section 01 60 00 - Materials and Equipment.

2.3 WOOD MATERIALS

- A. Hardwood Lumber:
 - a. Custom Grade in accordance with applicable standard specified herein under "Quality Assurance," average moisture content of 6 percent.
 - b. Species and Cut: As indicated on Drawings.

2.4 SHEET MATERIALS

- A. Hardwood Plywood: Core materials of veneer, type of glue recommended for application; face veneer and cuts As indicated on Drawings.
 - 1. Baltic Plywood shall be used in the construction of drawers and cabinet doors, including those to have plastic laminate finish.
 - 2. Wood and agrifiber products must contain no added urea-formaldehyde resins in accordance with the requirements of "Low Emitting Materials" as specified in Section 01 60 00 - Materials and Equipment.
 - 3. Adhesives shall be in accordance with the low-emitting materials requirements of Section 01 60 00 - Materials and Equipment.
- B. Softwood Plywood: DOC PS 1, MDO (Medium Density Overlay), or other overlay plywood product suitable for application of plastic laminate as approved by the Architect.
 - 1. Baltic Plywood shall be used in the construction of drawers and cabinet doors, including those to have plastic laminate finish.
 - 2. Wood and agrifiber products must contain no added urea-formaldehyde resins in accordance with the requirements of "Low Emitting Materials" as specified in Section 01 60 00 - Materials and Equipment.
 - 3. Adhesives shall be in accordance with the low-emitting materials requirements of Section 01 60 00 - Materials and Equipment.

- C. Wood Particleboard: Not used.
- D. Hardboard: Not used.
- E. Medium Density Fiberboard (MDF): Not used.

2.5 LAMINATE MATERIALS

- A. Plastic Laminate: High pressure decorative type.
 1. Horizontal Grade: NEMA LD-3, Grade GP50, .050 inch thickness.
 2. Vertical Grade: NEMA LD-3, Grade GP28, (.028 inch thickness). This grade of laminate shall be counterbalanced.
 3. Post Forming Grade: NEMA LD-3, Grade PF 42.
 4. Cabinet Liner Grade: NEMA LD-3, Grade CL-20, (.020 inch thickness). This grade of laminate shall be counterbalanced.
 5. Melamine: Not acceptable for this project.
 6. Backer: NEMA LD-3, Grade BK-20 (.020 inch thickness).
 7. Finishes, Colors and Patterns: As indicated on Drawings.

2.6 ACCESSORIES

- A. Adhesive: Type recommended by Laminate Manufacturer to suit application and as follows.
 1. In accordance with the low-emitting materials requirements of Section 01 60 00 - Materials and Equipment.
 2. PVA (polyvinyl acetate) or MDI (polyisocyanurate) adhesive shall be used.
- B. Wall Adhesive:
 1. Cartridge type compatible with paneling and wall substrate.
 2. In accordance with the low-emitting materials requirements of Section 01 60 00 - Materials and Equipment.
- C. Edge Trim: Extruded convex or flat shaped plastic as indicated on Drawings; smooth finish, self locking serrated tongue, of width to match components thickness, color as selected or noted on Drawings.
- D. Glass: As specified in Section 08 80 00.
- E. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application. Threaded steel for concealed joints.

2.7 HARDWARE

- A. Shelf Standards and Supports for Cabinet Mounted Shelving: K&V 255 standards and 256 supports.
- B. Shelf Standard and Brackets for Wall Mounted Shelving: K&V 85 Double-Slot Wall Standard and No. 185 Double-Flange Wall Brackets.
- C. Shelf Support Pins: K&V 333, 7/32 inch diameter shelf pins.
- D. Drawer and Door Pulls: Stainless steel wire pull type.
- E. Sliding Door Pulls: Grant 426
- F. Catches: Stanley 41 or K&V 43.

- G. Drawer Slides: Conforming to ANSI/BIFMA X5.6, UL 1678 and UL 1286.
 1. Light and medium duty drawers -24 inch wide or less: Accuride 7432 ball bearing, rail mount, full extension slides with 100 lb./pr. load rating. Provide Accuride 7434 overtravel slides where drawers require full access.
 2. Heavy duty drawers - 42 in wide or less: Accuride 3640 ball bearing, rail mount, full extension slides plus 1 inch (25mm) overtravel with 200 lb./pr. loadrating.
 3. Finish: Clear zinc.
- H. Cabinet Hinges: Rockford Process Control, 851 overlay bushed stainless steel.
- I. Sliding Door Track Assemblies: Grant 600 Series.
- J. Locks: National C8138 for drawings, Nation 8123 for doors.
- K. Finish: Brushed chrome or similar as selected by Architect.

2.8 FINISHING MATERIALS

- A. Finishing Materials: As specified in Section 09 91 00.

2.9 FABRICATION

- A. Fabricate architectural woodwork and cabinets in conformance with Premium Grade Standards in accordance with applicable standard specified herein under "Quality Assurance."
- B. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.
- C. Cap shelves, doors, and other exposed edges with edging to match cabinet face. Use one piece for full length only.
- D. Sides, bottoms, backs and doors are to be 3/4 inch exterior glue plywood with plastic laminated on all exposed sides.
- E. Shelves: Fabricate shelves with 3/4 inch thick exterior rated plywood covered on both sides with plastic laminated, edge faced with 1-1/4 inch banding, and adjustable.
- F. Shelf Standards within Casework: Set shelf standards within recessed groove of same width and depth as shelf standard.
- G. Countertops:
 1. Stainless Steel: In accordance with Section 05 70 00. Subtop to be 3/4 inch plywood.
 2. Plastic Laminate Faced Countertops: Fabricated plastic laminate faced countertops with separate back splash and separate side splashes with integral scribe for fitting to wall.
 - a. Countertop Edge Treatment: Square edge.
 - b. Locate counter butt joints minimum 2 feet from sink cut-outs.
- H. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

- I. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arrises. .
- J. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
- K. Provide cutouts for appliances, outlet boxes, fixtures and fittings. Verify locations of cutouts from on-site dimensions. Seal contact surfaces of cut edges.
- L. District Map: A smooth wall surface 10'-0" by 10'-0" shall be constructed of 3/4 inch plywood, edge banded and joints sealed, painted white to take sizing/paper shall be provided for district map as noted on Drawings.
- M. Workbench: Provide 30 inch by 8'-0" work bench construed with a solid 1-1/2 inch thick hardwood top covered with galvanized sheet metal. A storage base cabinet with doors mounted on Rockford Process Control 851 overlay hinges and drawers on heavy duty glides shall be provided below the work bench. Upper cabinet shall be provided. A space with backing shall be provided for 5" mounting, heavy duty vise (Owner furnished – Owner-installed) on workbench top.
- N. Sleeping Areas:
 - 1. Desktops are to be built into each room.
 - 1. Crew rooms are to have 30 inch desktop units.
 - 2. Captains: Provide 5'-0" desk with file drawer and pencil drawer.
 - 3. Battalion Chief (if applicable): Provide 6'-0" desk in office with drawers on each side and pencil drawer.
 - 2. Bed pedestal base units are to be provided with 3 full sliding drawers under them.

2.10 SHOP FINISHING

- A. Sand Work smooth and set exposed fasteners; apply wood filler.
- B. Apply wood filler in exposed nail and fastener indentations. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and types recommended for applied finishes.
- C. Finish work in the factory in accordance with finish system #9 in accordance with "Architectural Woodwork Standards Section 5 - "Finishing."
- D. Seal surfaces in contact with cementitious materials.
- E. Seal internal surfaces of cabinets with two coats of sealer, except where cabinets are constructed of prefinished plywood or finished internally with cabinet liner.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other Work which affects, connects with, or will be concealed by this Work.

3.2 INSTALLATION

- A. Set and secure cabinetry and other woodwork in place; rigid, plumb and level, and in accordance with applicable standard specified herein under "Quality Assurance" for grade of work specified.
- B. Use fixture attachments in concealed locations for wall mounted components.
- C. Secure and align adjoining cabinet units and counter tops with concealed joint fasteners.
- D. Scribe casework abutting other components, with maximum gaps of 1/32 inch (0.03125 inch). Do not use additional overlay trim for this purpose.
- E. Secure cabinet and bases to floor using appropriate angles and anchorages.
- F. Where exposed anchors or fasteners are unavoidable in the finish Work, countersink anchorage devices at exposed locations and conceal with plastic or laminate faced plugs to match surrounding plastic laminate, finish flush with surrounding surfaces.
- G. Install trim in single lengths without splices where possible. Miter external corners and cope internal corners.

3.3 FIELD FINISHING

- A. Sand Work smooth and set exposed fasteners.
- B. Prime, fill, and finish Work of this Section in accordance with Section 09 9100.

3.4 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

SECTION 06 61 16

SOLID POLYMER FABRICATIONS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Provide solid surface countertops at toilet rooms and bathrooms.

1.2 SUBMITTALS

- A. Product Data: Indicate product description, fabrication information and compliance with specified performance requirements.
- B. Shop Drawings: Indicate dimensions, component sizes, fabrication details, attachment provisions and coordination requirements with adjacent work.
- C. Samples: Submit minimum 6 inches x 6 inches samples. Indicate full range of color and pattern variation. Approved samples will be retained as a standard for work.
- D. Maintenance Data: Submit manufacturer's care and maintenance data, including repair and cleaning instructions.
- E. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 QUALITY ASSURANCE

- A. Fabricator/Installer Qualifications:
 - 1. Subject to approval by Architect and Resident Engineer.
 - 2. Have adequate physical facilities and sufficient production capacity to produce, transport, deliver, and install the required units without causing delay in the work.
 - 3. Have a minimum of 2 years of fabrication experience.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver no components to project site until areas are ready for installation. Store indoors in a dry area and away from extreme temperatures.
- B. Deliver materials and accessory products in manufacturer's unopened containers.
- C. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.5 WARRANTY

- A. Provide manufacturer's standard ten year limited warranty against visible defects and failure due to manufacturing defects. Damage caused by physical or chemical abuse or damage from excessive heat is excluded from warranty. Warranty shall provide material and labor to repair or replace defective materials.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Furnish plastic products of one of the following manufacturers, except as approved by the Architect and Resident Engineer, subject to compliance with Specification requirements.
 - a. Corian as manufactured by Du Pont, Inc., Wilmington, DE (800) 551-2121
www.dupont.com/corian/
 - b. Or equal approved by Architect and Resident Engineer.

2.2 MATERIALS

- A. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
- B. Solid polymer fabrications:
 - 1. Conform to ANSI Z124-1980, Type 6 and Fed. Specification WW-P-541E/GEN (August 1, 1980).
 - 2. USDA approved for food preparation use.
 - 3. Cast, filled acrylic or polyester/acrylic blend, not coated, laminated or of composite construction.
- C. Provide edge details as shown on the Drawings.
- D. Exposed joints shall be in locations shown on the Drawings. Seams not indicated on the Drawings shall be unexposed and adhesively joined. Adhesive shall be in accordance with the low-emitting materials requirements of Section 01 60 00 - Materials and Equipment.
- E. Provide backsplashes, where shown on the Drawings, to dimensions shown on the Drawings.
- F. Provide solid polymer bowls and/or lavatories, sinks in locations shown on the drawings.
- G. Finish and Color(s): "Platinum" (Corian by Du Pont)

2.3 ACCESSORY PRODUCTS

- A. Adhesives: Solvent free, zero VOC, nonflammable, nontoxic and acceptable to Architect and Resident Engineer for application as required by Section 01 60 00.
 - 1. Joint Adhesive: To create inconspicuous, non-porous joints. Color to match fabrication material.
 - 2. Panel Adhesive: ANSI A136.1-1967 and UL(R) listed.
- B. Sealant:
 - 1. For conditions exposed to moisture; Manufacturer's standard mildew-resistant, FDA/UL(R) recognized silicone sealant in colors matching components.
 - 2. For conditions not exposed to moisture; Manufacturer's standard silicone sealant in colors matching polymer material.
 - 3. Sealants shall be in accordance with the low-emitting materials requirements of Section 01 60 00 - Materials and Equipment.

2.4 FABRICATION

- A. Factory fabricate components to greatest extent practicable to sizes and shapes indicated, in accordance with approved shop drawings.
- B. Form joints between components using manufacturer's standard joint adhesive (compliant with the low-emitting materials requirements of Section 01 60 00 - Materials and Equipment); without conspicuous joints.
- C. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the drawings.
- D. Cut and finish component edges with clean, sharp returns. Route radii and contours to template. Repair or reject defective and inaccurate work.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other work which affects, connects with, or will be concealed by this Work.

3.2 INSTALLATION

- A. Install components plumb and level, scribed to adjacent finishes, in accordance with approved shop drawings and manufacturer's installation instructions.
- B. Form field joints using manufacturer's recommended adhesive (compliant with the low-emitting materials requirements of Section 01 60 00 - Materials and Equipment), with joints inconspicuous in finished work. Keep components and hands clean when making joints.
- C. Provide backsplashes and sidesplashes as indicated on the drawings. Adhere to countertops using manufacturer's standard color-matched silicone sealant and panel adhesive (with sealant and adhesives compliant with the low-emitting materials requirements of Section 01 60 00 - Materials and Equipment).
- D. Keep components and hands clean during installation. Remove adhesives, sealants and other stains. Keep clean until Date of Substantial Completion. Replace stained components.
- E. Lavatories/Sinks: Make plumbing connections to sinks in accordance with applicable Division 22 Sections

3.3 PROTECTION

- A. Protect surfaces from damage until Date of Substantial Completion. Repair work or replace damaged work that cannot be repaired to Architect's and Resident Engineer's satisfaction.

3.4 CLEANING.

- A. During the course of the Work and on completion of the Work, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

SECTION 07 11 13

BITUMINOUS DAMPPROOFING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Damproofing at retaining walls, planters and other locations that do not have occupied living space adjacent to opposite side of wall

1.2 SUBMITTALS

- A. Product Data: Submit Manufacturer's data, installation instructions, limitations and recommendations. Include certification of data indicating VOC content of components.
- B. Samples: Submit samples of membrane and protection board.
- C. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 QUALITY ASSURANCE

- A. Applicator Qualifications: Minimum 2 years experience with Projects of similar scope and complexity. Applicator shall be approved by Manufacturer.
- B. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this Work with related and adjacent Work. Agenda for meeting shall include review of special details and flashing.
- C. Manufacturer's Representative: Make arrangements necessary to have a trained employee of the Manufacturer on-site periodically during dampproofing work to review installation procedures.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Materials shall be delivered in Manufacturer's original unopened packages with Manufacturer's labels intact.
- B. Material shall be protected from rain and physical damage. Store materials away from sparks or flames. Store membrane where it will not exceed 90 degrees F. for extended periods.
- C. Outdoors, place cartons on raised pallets and cover completely. Follow Manufacturer's directions.

1.5 PROJECT/SITE CONDITIONS

- A. Perform Work only when existing and forecasted weather conditions are within the limits established by the Manufacturer of the materials and products used.
- B. Proceed with installation only when substrate construction and preparation Work is complete and in condition to receive dampproofing.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Dampproofing Membrane: Cold-applied, emulsified-asphalt damproofing complying with ASTM D1227, Type III, Class 1, spray applied. Provide one of the products by one of the following manufacturers, subject to compliance with specification requirements:
1. HE788 - Non-Fbr Asph Emul Dmpprfng, Henry Company www.henry.com
 2. Karnak #100 Non-Fibered Emulsion Damproofing, Karnak Corporation www.karnakcorp.com
 3. Hydrocide 600, Sonneborn, Div. Of ChemRex, Inc. www.masterbuilders.com
 4. Dehydratine 75, Tamms Industries www.tamms.com
 5. Sealmatic Emulsion Type I, W.R. Meadows, Inc. www.wrmeadows.com
 6. Or equal.
- B. Protection Material: One inch thick expanded polystyrene.

PART 3 EXECUTION

3.1 EXAMINATION

- A. The installer shall examine conditions of substrates and other conditions under which this Work is to be performed and notify Contractor, in writing, of circumstances detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 PREPARATION OF SUBSTRATES

- A. Surface Preparation: All surfaces to be coated shall be structural sound, clean, free of dust, dirt, mortar, residue, curing and parting compounds, and other contaminants.
1. Clean surfaces by use of wire brush, sandblasting or mechanical means as recommended by the damproofing manufacturer.
 2. Seal voids and cracks in surface as recommended by damproofing manufacturer. Use cement mortar, Fibered emulsion mastic, or other fillers and sealants compatible with asphalt emulsion damproofing and approved by damproofing manufacturer.
 3. Dampen dry surfaces with water and keep damp prior to application as recommended by damproofing manufacturer.
 4. Damproofing may be applied to damp or green concrete surfaces as approved by the manufacturer.
 5. Masonry Substrates: Assure mortar joints are smooth and flush with masonry surface. Apply parge coat as recommended by damproofing manufacturer to achieve smooth acceptable surface and forming a cove at the joint between wall and footing.
- B. Related Materials: Treat joints and install flashings as recommended by Damproofing Manufacturer.

3.3 INSTALLATION

- A. Application, General: Comply with Manufacturer's literature for recommendations on installation, including but not limited to, the following:
 - 1. Apply by spray application at rate recommended by manufacturer in continuous unbroken film, free of pinholes, filling and spreading around all joints, slots, grooves and penetrating into all crevices, chases, reveals, soffits, and corners.
 - 2. Carry coating over exposed footing's top and outside edges and up vertical wall to finished grade line.
 - 3. Recoat areas not dampproofed if contaminated by dust.
 - 4. Mask and protect adjoining exposed finish surfaces.
- B. Concrete and Other Dense Surfaces: Apply dampproofing in single coat application at rate recommended by manufacturer.
- C. Concrete Masonry Surfaces: Apply dampproofing in two coat application.
 - 1. Apply prime coat of asphalt emulsion dampproofing diluted with clean, cool water at rate recommended by manufacturer.
 - 2. Allow prime coat to dry to the point where it is tacky to the touch prior to application of second coat.
 - 3. Apply dampproofing top or second coat at rate recommended by manufacturer.
- D. Protection Materials: Apply protection board or sheet and related materials in accordance with Manufacturer's recommendations.
- E. Allow dampproofing to cure minimum time as recommended by manufacturer prior to backfilling.

3.4 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

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SECTION 07 18 13

PEDESTRIAN TRAFFIC COATING (Deck Coating)

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Waterproof coating system (deck coating) at above grade concrete deck.

1.2 QUALITY ASSURANCE

- A. Installer Qualifications: Perform work employing a factory-authorized installer. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with specified requirements and methods needed for proper performance of the Work.
- B. Pre-Installation Conference: Prior to commencement of the traffic coating work, schedule a meeting at a mutually agreeable time to include the Architect and Resident Engineer, Contractor, Contractor's field superintendent, traffic coating installer, traffic coating materials manufacturer's representative, and other appropriate interested parties to review methods and procedures to be used.
- C. Regulatory Requirements: Comply with VOC regulations.

1.3 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings and manufacturer's data for the following items:
 - 1. Outline of area to receive traffic coating system.
 - 2. Locations, details and types of penetrations.
 - 3. Perimeter and vertical details.
 - 4. Perimeter and expansion joint locations.
- B. Samples: Submit samples of manufacturer's standard colors.
- C. Certificates: Submit certification from the manufacturer indicating approval of the applicator and submit certifications from both the manufacturer and applicator that the substrate and the details are proper and adequate for the materials being furnished.
- D. Installation Report: At completion of Work, manufacturer's representative shall write report on installation summarizing installation and certifying that installation meets manufacturer's requirements for properly functioning system with no leaks.
- E. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in manufacturer's original unopened packaging with labels intact. Protect finished surfaces with removable wrapping or coating which will not bond when exposed to sunlight.
- B. Storage: Adequately protect against damage while stored at the site.
- C. Handling: Comply with manufacturer's instructions.

1.5 WARRANTY

- A. Provide manufacturer's standard written warranty that traffic coating system will remain watertight for a period of 5 years. Upon notification of defects within warranty period, make necessary repairs and replacements at the convenience of the Owner. Repairs and replacements shall include resultant damage to adjacent materials, systems and equipment.

1.6 PROJECT CONDITIONS

- A. Environmental Requirements: Apply components of the traffic coating system at surface and ambient temperatures of 40° F. or above with fair, dry weather conditions. For applications below 40° F., follow membrane manufacturers written instructions. Do not apply surface coatings and adhesives when rain is expected within two hours.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Provide products as manufactured by one of the following, subject to conformance with specifications:
 - 1. Gaco Western (800) 456-4226 www.gaco.com
 - 2. Neogard, (214) 353-1689 www.neogard.com
 - 3. Or equal.

2.2 MATERIALS

- A. General
 - 1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 - 2. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
- B. Gaco Western GacoDeck GW-14U or equal:
 - 1. Primer: As recommended by manufacturer.
 - 2. Sheet Flashing: Gaco Western NF-621 elastomeric sheet flashing material having a minimum thickness of 60 mils or equal.
 - 3. Liquid Flashing: Gaco Western UB-64 polyurethane coating or equal.
 - 4. Aggregate: Shelfil 18/40 or equal.
 - 5. Coating: Gaco Western UB 64 or equal, color to be as selected by Architect and Resident Engineer.
 - 6. Sealant: Sonneborn NP-1, SikaFlex A-1 or equal.
 - 7. Reinforcing Tape: Gaco Western 66-B or equal.

- C. Neogard Peda Gard II.
1. Primer: As recommended by manufacturer.
 2. Sheet Flashing; Elastomeric sheet flashing material having a minimum thickness of 60 mils.
 3. Liquid Flashing; Neogard 7400 series or 70420 series polyurethane coating or equal.
 4. Aggregate: Uniformly Graded 16/30 mesh silica sand with 6.5 +.5 MOH hardness as approved by manufacturer.
 5. Coating: Neogard 7400 series or 70420 series polyurethane coating or equal, color to be as selected by Architect and Resident Engineer.
 6. Sealant: Neogard 70991 Sealant or equal.
 7. Reinforcing Tape: As recommended by manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
1. Verify that work of all other trades which penetrates walls and decking or requires men and equipment to transverse area prior to installation of traffic coating has been complete.
 2. Surfaces: Verify that surfaces meet the requirements of the manufacturer's written specifications, as applicable, regarding concrete finishing and curing. Inspect to ensure that surfaces to receive membrane are dry, smooth, rigid, clean, frost-free, and free of voids, dirt, debris, sharp projections, grease, oil, or other contaminants.
- B. Coordination: Coordinate with other work which affects, connects with, or will be concealed by this Work.

3.2 PREPARATION

- A. Surface Preparation: Remove dust from the surface immediately before application of primer. Repair defects prior to primer application.
- B. Verify that penetrations through the surfaces to be treated are completed prior to the application of the waterproofing.
- C. Concrete: If required by manufacturer's published instructions, treat concrete surfaces with 10% to 15% solution of muriatic acid to remove laitance and impurities. Rinse in accordance with manufacturer's instructions. Following thorough drying of the surface, apply primer and sealer coats as required by the manufacturer.
- D. Cracks and Cold Joints: Visible cracks, up to 1/16" in width shall be cleaned, primed and treated with polyurethane deck coating material a minimum distance of 2" on each side of the crack to yield a total thickness of 30 dry mils. Large cracks shall be routed and sealed with Gaco Western UB-64 and 66-B tape or Neogard 70991 and reinforcing tape.
- E. Metal surfaces: Mechanically clean and wipe with Xylol, then prime with manufacturer's recommended primer.

- F. Exposed metal projections: Prepare in accordance with manufacturer's printed details.
- G. Joints and Edge Detailing: Apply 10 mil by 6 inch wide detail coat of specified Coating at all joints. Allow to tack. Place specified Reinforcing Fabric in Coating as shown in manufacturer's details.

3.3 INSTALLATION

- A. General: Install the work of this Section in accordance with manufacturer's written instructions and recommendations. Provide nominal 42 mil system, including aggregate.
- B. Apply primer at rate recommended by manufacturer to produce shiny surface. Primer may be re-coated when material has slight tack, but can no longer be lifted from surface. Allow to cure overnight. Reprime if left exposed for 24 hours.
- C. Apply reinforcing in detail coat of coating over control joints and cracks exceeding 1/16 inch. Allow to tack prior to placing reinforcing fabric.
- D. Apply base coat of traffic coating at 1-1/4 to 1-1/2 gallons per 100 square feet. Allow to cure.
- E. Apply wearing surface coat over cured base coat at one gallon per 100 square feet. Broadcast aggregate to fluid material. (Approximately 20 lbs. per 100 square feet for silica sand; 6 to 8 lbs. per 100 square feet for Shelfil.) Broadcast aggregate within 30 minutes of applying coating. Allow to cure.
- F. Apply lock coat of coating at a rate of one gallon per 100 square feet. Allow minimum of 24 hour cure before subjecting system to traffic.
- G. Deck coating system shall be turned up at vertical wall 2 to 4 inches as indicated on Drawings and in accordance with manufacturer's standard details to provide integral wall base.

3.4 FIELD QUALITY CONTROL

- A. Arrange for manufacturer's representative to inspect membrane thoroughly before covering. Make necessary corrections immediately.
- B. Provide for at least one interim inspection by the manufacturer's representative prior to application of aggregate.
- C. Completed traffic coating system shall be inspected by manufacturer's representative and accompanied by Contractor who shall assist as required to provide inspection of system.

3.5 CLEANING

- A. During the course of the Work and on completion of the Work, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

SECTION 07 19 00
WATER REPELLENTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Water repellent coating for masonry and concrete exposed to exterior.

1.2 DEFINITIONS

- A. Water Repellent: Resistant to penetration of water from rainfall.

1.3 SYSTEM DESCRIPTION

- A. Performance Requirements: The application of water repellent shall provide finished surfaces uniform in color without altering the natural texture of the substrate, and shall resist water penetration from rainfall.

1.4 SUBMITTALS

- A. Product Data: Submit recommended method of application and coverage rate.
- B. Samples: Submit samples of coating applied to materials used in the Project for review of the aesthetics, and effectiveness, accompanied with a letter stating the actual application rates required.
1. Manufacturer shall procure and apply system to samples of the masonry units to be used in the structure which will be reviewed by the Architect and Resident Engineer for both aesthetics and effectiveness.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer shall be able to show evidence that the firm has been engaged in producing such material for at least 2 years and that the product has a satisfactory field performance record of at least 2 years.
- B. Applicator Qualifications: Applicators shall be trained, approved and accepted by the Manufacturer and have a minimum of 2 years experience spraying specialty coatings.
- C. Regulatory Requirements: Comply with volatile organic compound (VOC) regulations in effect within the jurisdiction of the Project site.
- D. Mock-ups:
1. Apply water repellent to sample wall located at the job site using the identical procedures which will be used in making application of material on the remainder of the Project.
 2. The purpose of this sample will be to observe color uniformity and intensity, the method of application, including workmanship techniques and to water test surface after a 30 day period.
 3. Equipment to be used for actual application to building walls shall be used to apply materials to sample wall.
 4. The sample, when approved by the Architect and Resident Engineer, will function as a reference base for acceptance or rejection of color.

- E. Pre-Installation Conference: A representative of the manufacturer shall be present prior to and at the beginning of job application to review the work with the Architect and Resident Engineer and the Contractor. At this conference the manufacturer's representative shall also approve the wall and the suitability of the weather.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Delivery shall be made to the job site in Manufacturer's original containers with seals unbroken and labeled with Manufacturer's batch number.
- B. Storage and Protection: Store materials in original, unopened containers in compliance with Manufacturer's printed instructions and protect from damage.

1.7 PROJECT CONDITIONS

- A. Physical Requirements for Proper Installation or Application: Temperature and relative humidity conditions for a period before, during, and after application shall be as recommended by the Manufacturer. If rain occurs, allow surfaces to dry a minimum of 5 days.

1.8 WARRANTY

- A. Manufacturer shall provide a standard written warranty for a period of 5 years from date of project completion.
 - 1. Written warranty shall include the following provisions:
 - a. Coating will act as a water repellent for the full warranty period.
 - b. Coating will not peel or flake for the full warranty period.
 - 2. Upon satisfactory completion of the installation, and as a condition of its acceptance, the warranty shall be delivered to the Owner.
 - 3. If at any time during the warranty period, any such failure occurs resulting from ordinary weather conditions in any area to which the coating has been properly applied, the manufacturer shall agree to supply all material needed to repair such affected areas at no additional cost.
- B. The applicator shall guarantee the installation against poor workmanship for a period of 2 years from the date of Substantial Completion. Applicator shall make necessary repairs without charge to Owner during that period. Manufacturer shall guarantee material against moisture penetration for 5 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Furnish products of one of the following Manufacturers, subject to compliance with Specification requirements:
 - 1. Chemprobe Coating Systems, L.P.; Division of Tnemec Co., Inc. (represented by Teri Hand, (480) 951-8686) www.tnemec.com
 - 2. Diedrich Technologies, Inc. (represented by Lanton Associates, Anthony Evans (480) 303-9182. www.diedrichtechnologies.com
 - 3. Degussa Corporation, (represented by PCI Services, (480) 343-3030, (480) 828-8827) (800) (800) 828-0919 www.degussa.com
 - 4. ProSoCo., Inc. www.prosoco.com
 - 5. Rainguard Products Company (represented by Syd Bell (480) 893-3252 or (800) 898-3252). www.rainguard.com
 - 6. Tamms Industries, Inc. (represented by Lisa Zeller (602) 431-0292. www.tamms.com
 - 7. Or equal.

2.2 MATERIALS AND ACCESSORIES

- A. Water Repellent Sealer: Provide either silane or siloxane compounds (not a combination). The following are acceptable.
1. Silanes:
 - a. Weather Seal SL100; ProSoCo, Inc.
 - b. Regular or Super, Rainguard Products Company.
 - c. Blok-Lok, Rainguard Products Company.
 - d. Aqua-Trete EM, Degussa Corporation.
 - e. Or equal.
 2. Siloxanes:
 - a. Prime A Pell H₂O; Chemprobe Technologies, Inc.
 - b. WeatherSeal Siloxane WB; ProSoCo, Inc.
 - c. Baracade ME; Tamms Industries Co.
 - d. Diedrich 300-C, Diedrich Technologies, Inc.
 - e. Micro-Seal Concentrate, Rainguard Products Company.
 - f. Or equal.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions:
1. Carefully inspect the installed Work of other Trades, and verify that such Work is complete to the point where water repellent application may commence.
 2. The Manufacturer's representative shall verify that the water repellent can be applied in accordance with the Manufacturer's recommendations.
 3. Verify that cracks which exceed 1/64 inch (0.40mm) wide have been filled with pointing mortar or caulking material. Defective mortar joints shall be routed out, pointed with mortar and tooled.
 4. Verify that flashing and caulking materials have been installed properly.
 5. Verify that masonry has been cleaned as specified in Section 04 0120.52.

3.2 PREPARATION

- A. Protection:
1. Use all means necessary to protect clear water repellent before, during, and after installation and to protect the installed Work of other Trades.
 2. Metal, glass and other such items shall be protected by suitable masking materials to protect against overspray.
 3. In the event of damage, immediately make repairs and replacements necessary as acceptable to the Architect and Resident Engineer.
 4. Protect concrete sidewalks from runoff by soaking with water immediately prior to application on adjacent walls.
- B. Surface Preparation:
1. Allow walls to cure at least 30 days before clear water repellent is applied.
 2. Walls shall be free of excess mortar.
 3. Follow Manufacturer's instructions regarding allowable moisture level.

3.3 APPLICATION

- A. Water Repellent: Apply in accordance with Manufacturer's printed directions.

- B. Coverage:
 - 1. At no time shall rate of coverage be less than required by Manufacturer's directions.
 - 2. Applicator shall make proper material allowance based upon substrate when determining quantities of material.

3.4 SURFACES TO BE COATED

- A. Exterior exposed masonry and concrete surfaces. – VERTICAL WALLS.
- B. Exposed tops of masonry and concrete walls including parapets, fence/screen walls, planter walls, etc. - HORIZONTAL SURFACES.
- C. Roof side of exposed masonry and concrete parapet walls, lapping flashing - VERTICAL WALLS.
- D. Planter side of planter walls, lapping waterproofing (07 14 16) and soil - VERTICAL SURFACES.
- E. Other locations as indicated on Drawings.

3.5 FIELD QUALITY CONTROL

- A. Tests:
 - 1. Twenty days after completion of this portion of the Work, and as a condition of its acceptance, demonstrate by running water test that the Work of this Section will successfully repel water.
 - 2. Notify the Architect and Resident Engineer and Manufacturer at least 72 hours in advance and conduct the test in the presence of Architect and Resident Engineer and manufacturer's representative.
 - 3. By means of an outrigger or similar acceptable equipment, place 3/4 inch garden hose with garden type spray nozzle, at a point designated by the Architect and Resident Engineer, 8 feet to 10 feet away from the wall, aiming the nozzle so that water will strike the wall at a 45 degree downward angle.
 - 4. Run the water onto the wall at full available force for not less than 4 hours. Provisions shall be made to collect the run off water into a container, and if possible to reuse it in the test
 - 5. Upon completion of the four hour period, inspect the interior surface of the wall for evidence of moisture penetration.
 - 6. If evidence of moisture penetration is discovered, apply an additional coat of the repellent material to the areas where leakage occurred.
 - 7. An additional area or areas designated by the Architect and Resident Engineer shall be tested and corrected if leakage occurs.
 - 8. Architect and Resident Engineer may require additional tests until no leakage occurs.

3.6 CLEANING

- A. Clean spillage and overspray as recommended by the Manufacturer.
- B. During the course of the Work and on completion, remove excess materials, equipment and debris and dispose of away from premises.

END OF SECTION

SECTION 07 21 00

BUILDING INSULATION

PART 1 GENERAL

1.1 SUBMITTALS

- A. Product Data: Submit Manufacturer's data, installation instructions, limitations and recommendations. Include certification and test data substantiating R-Values and combustibility of each type of insulation.
- B. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.2 QUALITY ASSURANCE

- A. Regulatory Requirements: Conform to applicable code for fire resistance ratings and surface burning characteristics.
- B. Provide certificate of compliance acceptable to authorities having jurisdiction indicating conformance to fire-resistance requirements.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Storage: Deliver materials to job in Manufacturer's original unopened packaging. Adequately protect against damage while stored at the site. Deliver so that stocks of materials on the site will permit uninterrupted progress of the Work.
- B. Materials shall be properly identified on each package with the Manufacturer's name and R value.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Furnish products of one of the following Manufacturers, except as approved by the Architect and Resident Engineer, subject to compliance with Specification requirements:
 - 1. Board Insulation:
 - a. The Dow Chemical Co. www.dow.com/styrofoam/na/
 - b. Amoco Foam Products Co. www.bp.com/chemicals/who/units
 - c. UCI
 - d. Or equal
 - 2. Batt and Blanket Insulation:
 - a. Johns-Manville www.jm.com
 - b. Owens-Corning Fiberglas Corp. www.owenscorning.com
 - c. Certainteed www.certainteed.com
 - d. Or equal
- B. Materials designated for a specific application shall be the products of one Manufacturer.

2.2 MATERIALS

- A. General
 - 1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 - 2. Provide regional materials in accordance with Regional Materials provisions of Section 01 60 00.
- B. Rigid Insulation (Walls): Expanded polystyrene: ASTM C578, Type I, 0.9 lb./cu. ft. (15 kg/m³) nominal density.
 - 1. R-Value per inch
 - a. at 40 degree F: 4.0
 - b. at 75 degrees F: 3.6
 - 2. Thickness required for R-19: 5.27 inches
- C. Batt Insulation (Fiberglass): ASTM C665, glass fiber batts. Batt shall be a single thickness to meet the required R value, multiple layers of batts will not be accepted.
 - 1. Thickness: Provide minimum thickness as required to provide the resistance values as indicated in architectural construction assemblies and/or details.
 - 2. Wall and Roof locations: Type I unfaced formaldehyde-free batt R-19 insulation at exterior walls and R-30 wire supported at roofs, unless otherwise noted on Drawings. Areas behind spandrel glass sections shall be insulated.
- D. Fire Safing Insulation: ASTM C24, E119 and E136. Thickness shall be as required by the Manufacturer to provide a fire rating equal to that of the assembly of which it is a part. Where smoke stop protection also is required, install Thermafiber SmokeSeal Caulking Compound as needed to meet UL Standard 1479 and ASTM E814 procedure.
- E. Acoustical Batt Insulation: As specified in Section 09 81 00.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other work which affects, connects with, or will be concealed by this Work.

3.2 INSTALLATION

- A. Interior Board Insulation:
 - 1. Install board insulation at locations as indicated on Drawings.
 - 2. Insulate small areas between closely spaced framing members, pipe, conduit or other obstruction by cutting and fitting insulation materials as required to maintain the integrity of the insulation.
 - 3. Fit ends snugly or overlap.
 - 4. Under Refrigerators/Freezers: Install under slab and turn up at edge to match adjacent panels. Coordinate installation with equipment manufacturer.

- B. Batt Insulation:
1. Apply no insulation until such time as the Construction has progressed to the point that inclement weather will not damage or wet the insulation material.
 2. Fully insulate small areas between closely spaced framing members, pipes, conduits or other obstruction by cutting and fitting insulation material as required to maintain the integrity of the insulation.
 3. Batt insulation at metal studs and other non-nailable members shall be installed with vapor barriers in and flanges continuously tight against framing members. Secure in place with string wire or other method as approved by Architect and Resident Engineer.
 4. Place insulation tight to exterior wall or roof substrate without voids.
 5. End match neatly with ends fitting snugly.
- C Fire Safing Insulation: Install in proper sizes on safing clips as needed but not to exceed 24 inches O.C. Leave no voids between walls and edges of slabs.

3.3 CLEANING

- A. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of away from premises. Leave Work in clean condition.
- B. Protection: Take precautions to protect insulation, both during and after installation, from damage of any kind until covered.
- C. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

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SECTION 07 26 53

VAPOR REDUCTION FLOOR COATINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Furnishing, testing, and application of floor coatings for the reduction of water vapor transmission for interior concrete slabs requiring the installation of ceramic tile, VCT, vinyl, wood, carpet, and/or epoxy flooring.
- B. Related Sections - Coordinate work of this Section with work of other Sections to properly execute the work requirements and maintain satisfactory progress of work of other Sections.
 - 1. Section 03 30 00 - Cast-In Place Concrete: Installation and curing requirements.
 - 2. Section 09 30 00 - Tile: Installation requirements for tile floors.
 - 3. Section 09 65 19 - Resilient Flooring: Installation requirements for resilient flooring.
 - 4. Section 09 68 13 - Carpet Tile: Installation requirements for carpeting.

1.2 SYSTEM DESCRIPTION

- A. Provide one, or both, of the following systems as required to reduce the moisture vapor emissions from concrete floor slabs to that amount acceptable to meet finish floor manufacturer requirements. The initial calcium chloride tests performed for interior concrete slab areas receiving ceramic tile, VCT, vinyl, wood, carpet, and/or epoxy flooring systems will determine the location where each system shall be required.
 - 1. Koester VAP 1 System (or equal):
 - a. System shall be comprised of the full VAP 1 System which is 2 coats of VAP Primer followed by one coat of VAP Top Coat and a final coat of VAP Primer.
 - b. This system is required on concrete floors with a water vapor transmission level greater than 8 lbs./24 hrs per 1,000 sf.
 - 2. Koester VAP Primer System (or equal):
 - a. System shall consist of 3 coats of VAP Primer only.
 - b. This system is required on concrete floors with a water vapor transmission level less than 8 lbs./24 hrs per 1,000 sf.
- B. Areas Not Requiring Vapor Reduction Floor Coating
 - 1. Vapor Reduction Floor Coating is not required on interior concrete slabs without floor finish materials.
 - 2. The initial calcium chloride tests for interior concrete slab areas receiving ceramic tile, VCT, vinyl, wood, carpet, and/or epoxy flooring will determine where this system will not be required. Vapor Reduction Floor Coating is not required on concrete floors with water vapor transmission level less than 3 lbs./24 hrs per 1,000 sf. This is only acceptable if the ceramic tile, VCT, vinyl, wood, carpet, and/or epoxy flooring Manufacturer and Owner approve.

1.3 SUBMITTALS

- A. Product Data: For each type of product and process specified, which shall include:
 - 1. Manufacturer's Specification.
 - 2. Installation Instructions.

- B. Provide a list of 10 similar projects with a minimum of 2 years performance history. Similar projects shall be installations with initial vapor transmission rates of 15 lbs./ per 1,000 sf./ per 24 hrs. minimum having maintained vapor reduction rates of 3 lbs./ per 1,000 sf. / per 24 hrs. or less.
- C. Submit calcium chloride test results (prior to and after installation of vapor reduction floor coating) to the Architect and Resident Engineer, Owner, Contractor, and Vapor Reduction Floor Coating Manufacturer's Representative.

1.4 QUALITY ASSURANCE

- A. Qualifications of applicator
 - 1. Employ an applicator currently certified by the manufacturer, experienced in surface preparation and application of the material and subject to inspection and control of the manufacturer.
 - 2. Applicator should have no less than 2 years experience in the use of epoxy resin base coating application.
- B. Manufacturer's Qualification
 - 1. Manufacturer shall have no less than 2 years experience in the manufacturing of epoxy based water Vapor Reduction Floor Coating.
 - 2. Manufacturer must provide independent lab test reports documenting performance per the following:
 - a. ASTM E96, Water Vapor Transmission (dry and wet methods).
 - b. ASTM D4541 Adhesion Properties (after ASTM E96).
 - c. ASTM C309, Liquid Membrane-Forming Compounds for Curing Concrete.
 - d. ASTM C156, Water Retention by Concrete Curing Materials.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the job site in their original unopened containers, clearly labeled with the manufacturer's name and brand designation.
- B. Store products in an approved ventilated dry area; protect from dampness, freezing, and direct sun light. Product should not be stored in areas with temperatures in excess of 90 F or below 50 degrees F.
- C. Handle product in a manner that will prevent breakage of containers and damage products.

1.6 PROJECT/SITE CONDITIONS

- A. Environmental Conditions
 - 1. Do not apply Vapor Reduction Floor Coating to unprotected surfaces in wet weather or to surfaces on which ice, frost, or water is visible.
 - 2. Do not apply the Vapor Reduction Floor Coatings when the ambient/surface temperatures are below 50 degrees F (or expected to fall below this temperature within 24 hours from time of application) or above 90 degrees F
 - 3. Do not apply Vapor Reduction Floor Coating in rain, fog, snow, or mist.
 - 4. Never apply Vapor Reduction Floor Coatings to surfaces exposed to the sun.
- B. Protection: Protect Vapor Reduction Floor Coating to prevent damage from active rain or topical water for a minimum period of 24 hours from time of application.

1.7 SCHEDULING

- A. Two weeks before the installation of the ceramic tile, VCT, vinyl, wood, carpet, and/or epoxy flooring systems over the interior concrete slabs, provide initial calcium chloride tests as specified herein to determine the level of water vapor transmission in the slab and the type of Vapor Reduction Floor Coating required.
- B. Contractor shall coordinate scheduling Vapor Reduction Floor Coating installation and allowing enough time to test, submit and apply the Vapor Reduction Floor Coating before installation of floor finish.
- C. Contractor shall allow for as much time as is reasonable for the concrete slab to dry before testing the Vapor Reduction Floor Coating performance.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Koester American Corporation, 1206 Laskin Road, Suite 201 E, Virginia Beach, VA 23451 (757) 425-1206 locally distributed by Specified Polymers (Michael Hyduk), San Diego, CA (619) 294-8010, www.koester.com or approved equal.

2.2 MATERIALS

- A. General:
 - 1. Use specified materials of one manufacturer throughout project.
 - 2. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 - 3. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
 - 4. Provide materials in accordance with the low-emitting materials requirements of Section 01 60 00 - Materials and Equipment.
- B. VAP Primer and VAP Top Coat: Water-based primer/curing agents containing epoxy resins and other specifically formulated chemicals to provide the following characteristics and properties.
 - 1. Adhesion: Minimum 375 psi in accordance with ASTM D4541.
 - 2. Water Vapor Transmission Reduction: Performance documented at no less than 90% water vapor transmission reduction compared to the untreated concrete slab by independent testing company when tested in accordance to ASTM E96 wet method.
 - 3. VOC Content: No more than 0.1 lbs./gallon, mixed.
 - 4. Conform to ASTM C309, Liquid Membrane-Forming Compounds for Curing Concrete and ASTM C156, Water Retention by Concrete Curing Materials.
- C. Cementitious underlayment system (if required to level the floor over the VAP Systems): As required by vapor reduction floor coating manufacturer.
 - 1. Tested and approved by VAP system manufacturer prior to installation.
 - 2. No underlayment system with gypsum will be allowed.

2.3 MIXING

- A. Use clean containers, mix thoroughly as per Manufacturer's requirements to obtain a homogeneous mixture using a low speed motor (below 400 rpm) and a Jiffy two blade type mixer. DO NOT AERATE.
- B. VAP Primer Mix Ratio: Mix Component A and B at a ratio of 3:2.
- C. VAP 1 Top Coat Mix Ratio: Mix Component A and B at a ratio of 4:1.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Inspect surfaces with regard to their suitability to receive Vapor Reduction Floor Coating with the Manufacturer's Representative.
- B. Verify that surfaces to be treated with Vapor Reduction Floor Coatings have NOT previously been treated with other materials like underlayments, screeds, penetrating sealants, etc. If this is the case, consult with the Vapor Reduction Floor Coating Manufacturers Representative prior to any application of Vapor Reduction Floor Coatings.
- C. Calcium chloride test requirements:
 - 1. Two weeks before installation of the ceramic tile, VCT, vinyl, wood, carpet, and/or epoxy flooring systems over the interior concrete slabs provide calcium chloride test to determine the level of water vapor transmission in the slab.
 - 2. Conduct testing in accordance with ASTM F1869 or ASTM E1907 (quantitative anhydrous calcium chloride test).
 - 3. Conduct calcium chloride tests after HVAC system has been in continuous use for 36 hours with a minimum ambient temperature of 72 degrees F. Water vapor transmission levels are directly affected by ambient room temperature and readings conducted without a sustained ambient temperature is NOT acceptable.
 - 4. Document test results and provide recommendations on the type of Vapor Reduction Floor Coating to be used by area.
 - 5. Provide test results with a marked up floor finish plan showing test results.
 - 6. Provide a written clarification on status of HVAC system before and during the test and the length of time the ambient air temperature was maintained before the tests.
 - 7. Provide a marked up floor plan showing areas with Vapor Reduction Floor Coating recommendations.

3.2 PREPARATION

- A. Clean surfaces to receive Vapor Reduction Floor Coatings.
 - 1. Shotblast floors to receive system.
 - 2. Remove defective materials, and foreign matter such as dust, adhesives, leveling compounds, paint, dirt, grease, curing agents, form release agents, efflorescence, laitance, Shotblast beebees, etc.
 - 3. Repair cracks, expansion joint, control joints, and open surface honeycombs and fill in accordance with Manufacturers recommendations.
 - 4. Acid etching or grinding is not acceptable for surface preparation.
 - 5. Provide uncontaminated surface.

- B. Dampen, Surface Saturated Dry (SSD), uncontaminated concrete, leaving NO standing water. Surfaces shall be damp, not wet to the touch. Use clean potable water to pre-dampen concrete surfaces. Only pre-dampen concrete prior to first VAP Primer coat. Do NOT pre-dampen between subsequent coats of VAP Systems.

3.3 APPLICATION

- A. VAP Primer coat application:
 - 1. Spray VAP Primer leaving no areas untreated.
 - 2. Avoid puddling and pinholes when back brushing.
 - 3. Provide continuous ventilation during cure.
 - 4. Apply VAP Primer coats at a coverage rate of 300 sf. per gallon percoat.
- B. VAP Top Coat application:
 - 1. Apply VAP Top Coat using a squeegee and 3/8" nap roller leaving NO areas untreated.
 - 2. Avoid pin holes. To minimize air bubbles, use a spiked roller immediately after application of Top Coat.
 - 3. Provide continuous ventilation during cure.
 - 4. Apply VAP Top Coat at a coverage rate of 80 to 100 sf. per gallon unless otherwise directed by Manufacturer.
 - 5. Top coat shall be homogenous and no less than 15 dry mils in thickness, particularly over high points on floors.
- C. The VAP Primer System shall require a minimum of 6 hours drying time for the first Primer coat (based upon project conditions), a minimum of 6 hours of drying time for the second Primer coat (based upon project conditions), and 24 hours of drying time for the final Primer coat before the floor covering system can be installed.
- D. The VAP 1 System shall require 6 hours drying time for the first Primer coat, 24 hours of drying time for the second Primer coat, 12 hours of drying time for the Top Coat, 24 hours of drying time for the final Primer coat before the floor covering system can be installed.

3.4 FIELD QUALITY CONTROL

- A. Floor treatment calcium chloride tests:
 - 1. After drying of the final coat of the Vapor Reduction Floor Coating, provide calcium chloride tests to determine if the level of water vapor transmission has been reduced below 3 lbs./ per 1,000 sf./ per 24 hrs.
 - 2. Contact Architect and Resident Engineer, Owner, and Vapor Reduction Floor Coating Manufacturer's Representative concerning any areas with a water vapor transmission level greater than 3 lbs./24 hrs. per 1,000 sf.
- B. Adhesion tests:
 - 1. Test adhesion of flooring adhesives, coatings, and leveling compounds to the final VAP Primer Coat.
 - 2. Contact flooring Manufacturer for recommendations.

3.5 CLEANING

- A. Clean tools and equipment with water for VAP Primer System and xylene for VAP Top Coat System immediately after use.
- B. Remove debris resulting from VAP Systems installation from project site.
- C. Construction Waste: In accordance with Section 01 74 19.

3.6 PROTECTION

- A. Protect each coat during specified cure period from any kind of traffic, topical water, and contaminants.

END OF SECTION

SECTION 07 32 00

TWO-PIECED TAPERED MISSION CLAY ROOFING TILE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Formed clay roofing tiles, complete with components and other required accessories as needed for a complete and proper installation.
- B. Underlayment, eave, valley, rake, and ridge protection; nailers, sheet metal flashings and tile fastening.

1.2 REFERENCES

- A. ICBO Report No. 3523 - Clay Roofing Tiles.
- B. ASTM Standard Specifications
 - 1. C144 - Aggregate for masonry mortar.
 - 2. C150 - Portland Cement.
 - 3. D226 - Asphalt-saturated organic felt used in roofing and waterproofing.
 - 4. D1002 - Silicone sealant.
 - 5. D2626 - Asphalt-saturated and coated organic felt base used in roofing.
 - 6. D2822 - Asphalt roof cement.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Submit Shop Drawings showing details on hip, ridge, valley and rake configurations, methods of fastening, and collaborated details of related work.
- C. Product Data: Submit manufacturer's data on tile properties, configurations and colors.
- D. Samples: Submit two tile Samples illustrating color, surface finish and texture, and tile configuration for Architect's approval.

1.4 QUALITY ASSURANCE

- A. Use adequate number of skilled workmen who are thoroughly skilled and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods needed for proper performance of the Work of the Section.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. All material shall be handled and stored in a manner which will prevent its damage.
- B. Materials shall be stored in original pallets and shall be clearly marked with the manufacturer's name.

PART 2 PRODUCTS

2.1 CLAY ROOFING TILE

A. Where indicated on the Drawings, provide Two-Piece Tapered Mission Clay Roofing Tile as manufactured by US Tile Co., 909 Railroad St, Corona, CA 92882 (800) 252-9548, in color "_____ " with matching hip, ridge, rakes, boosters and birdstops.

2.2 OTHER MATERIALS

A. Underlayment:

1. Underlayment shall conform to one of the following:

- a. Roll underlayment: ASTM D226 non-perforated.
- b. Roll underlayment for areas of frequent ice build up or high wind areas: ASTM D2626.

B. Nailers:

1. Where indicated on the Drawings or where required for proper fastening, provide:

- a. 2 inch by 6 inch wood nailing strips at all hips and ridges.
- b. 2 inch by 4 inch wood nailing strips under first row of cover tile after gable roll, with adjacent 2 inch by 2 inch wood nailing strip along rake sides.

C. Flashing:

1. Valley flashing: minimum 26 gauge corrosion-resistant metal.
2. Other: lead, copper or other approved material.

D. Fasteners:

1. Nails: corrosion-resistant box nails, minimum 11 gauge.
2. Other: other approved fastening systems.

E. Mortar materials, plastic cement and sealant:

1. Sand: ASTM C144
2. Portland cement: ASTM C150s type 1.
3. Plastic cement: ASTM D2822.
4. Silicone sealant: ASTM D1002.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Verify that deck surfaces are clean, dry, free of ridges, warp or voids.

B. Verify roof openings are correctly framed prior to installing work of this Section. Do not proceed until all unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Underlayment:

1. For roof slopes of 3:12 to <4:12, two (2) layers of ASTM D226 Type II (No.30 Felt) are required per IBC and IRC.
2. For pitches of 4/12 and greater: Minimum one layer ASTM D226 Type II (No.30 Felt) (ASTM D4869 Type IV) head lapped 2 inches and end lapped 6 inches, or approved equal per UBC.

B. Flashing:

1. Flash at valleys in strict accordance with Chapter 15 of the Uniform Building Code:
 - a. Provide no lighter than 26 gauge corrosion resistant metal valley flashing that extends at least 11 inches each way from the center point.
 - b. Provide a splash diverter rib not less than 1 inch high at flow line formed as a part of flashing.
 - c. Provide end laps of not less than 6 inches.
 - d. Longitudinal edges shall be turned in not less than 30 degrees, and shall be not less than 1/2 inch in height to prevent water overflow.
 - e. For roof slopes of 3/12 and over, the metal valley flashing shall have a 36 inch wide underlayment directly under it consisting of a minimum of one layer of Type 15 felt running the full length of the valley, in addition to other specified underlayment.
2. At sides of dormers, chimneys and other walls, extend flashing at least 6 inches up vertical surface.
 - a. Thoroughly counter flash.
 - b. Extend flashing under tile at least 4 inches and turn edge up 1-1/2" inches.
3. At lower sides of dormers, chimneys and other walls, extend flashing at least 4 inches up wall and 4 inches over tile, and then thoroughly counter flash.
4. At wood saddles and returns, line with 16 oz. copper extending up roof slope not less than 14 inches, and up vertical walls not less than 6 inches, and thoroughly counter flash.
5. Make all counter flashing plugged, pointed and secure.

C. Birdstops, boosters and starters:

1. Install clay birdstops along entire length of all eaves.
2. Install first course of pan tile leaving a 2 to 3 inch overhang at eave.
3. Install 3 inch booster tiles on top of birdstops.
4. Install 15 inch starter tiles on top of booster tiles along perimeter of all eaves.

D. Fasteners: (Edit to avoid conflicting requirements)

1. At plywood decks, provide minimum of 11 gauge, large headed, corrosion resistant nails of sufficient length to penetrate 3/4 inches into or through the sheathing, whichever is less.

2. At nailable concrete decks, use stainless steel or silicon bronze screw shank nails of sufficient length to penetrate 1/2 to 3/4 their length into, but not through the deck.
3. Provide two fasteners per tile in snow areas.
4. In areas designated by the building officials as being subject to repeated wind velocities in excess of 80 mph, or where roof height exceeds 40 feet above grade, all tiles shall be attached as follows:
 - a. The heads of all tiles shall be nailed.
 - b. The noses of all eave tiles shall be fastened with approved clips.
 - c. All rake tiles shall be nailed with two nails.
 - d. The noses of all hip, ridge and rake tiles shall be set in a bead of approved roofer's mastic.
5. On slopes over 7/12, the nose end of all tiles shall be securely fastened with "Storm Locks" or "Wind Locks", as manufactured by The Wire Works, Inc (800)341-8828, or with other approved fastening system.
6. Provide Twisted Wire Tile-Tye, or Riness Tile-Tie system of brass, copper or galvanized wire as manufactured by The Wire works, Inc. (800)341-8828, or other approved fastening system.

E. Install field tile in courses beginning at eave working up incline of roof deck.

1. Install pan tiles in vertical rows at a maximum of 11 inch centers, with cover tiles fastened over the intervening spaces, providing a maximum exposure of 15 inches for each tile.
2. As an alternate, cover tiles may be laid with random exposures from 9 to 15 inches, visually breaking all horizontal lines.
3. As an alternate, end laps of cover tile can be embedded in cement mortar for a more rustic appearance.
4. As an alternate, cover tiles can be doubled using booster tiles laid dry or laid in cement mortar.
5. Install hip and ridge tiles:
 - a. Provide cement mortar or other approved materials at all hips and ridges to completely fill voids and to weatherproof the roof.
 - b. All hip, ridge and first row of cover tiles after gable roll shall be set in cement mortar and fastened by non-corrosive nails.
6. All tiles in contact with cement mortar shall be immersed in water for two minutes before laying.
7. To avoid color problems on roof:
 - a. Roof load tiles from different pallets.
 - b. Visually inspect application from the ground level after installing 100 tiles.
 - c. Visually verify that roof tile color is uniform and even, and verify that tile courses are straight and true.
8. Correct any color or installation problems before proceeding with the installation.
9. Complete installation to provide weather tight service.

3.3 CLEAN UP

- A. Clean roof to remove all pieces of debris.
- B. Remove and dispose of all work-related refuse and debris.

END OF SECTION

Products:

US Tile Authentic Clay Roof Tiles

SECTION 07 42 43.13

SOLID COMPOSITE EXTERIOR WALL PANEL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Exterior solid phenolic cladding panel system and accessories as required for a complete drained and back-ventilated rainscreen system.
 - 1. Exterior façade wall panels with exposed fasteners with aluminum bracketing system as provided by panel manufacturer over Water-Resistive Vapor Permeable Air Barrier Sheet over fiberglass faced gypsum sheathing panels..
 - 2. Fascia.
 - 3. Horizontal soffits.
 - 4. Storefront panels.
- B. Related Sections:
 - 1. Section 04 21 33 – Thin Brick Veneer: Brick veneer over fiberglass faced gypsum sheathing panels.
 - 2. Section 05 41 00 - Load-Bearing Metal Stud System: Metal Framing at exterior wall construction and steel strapping on studs.
 - 3. Section 09 24 00 – Portland Cement Plaster (Stucco): Stucco over fiberglass faced gypsum sheathing panels.

1.2 SYSTEM DESCRIPTION - WATER-RESISTIVE VAPOR PERMEABLE AIR BARRIER SHEET

- A. Supply labor, materials and equipment for a mechanically attached water-resistive vapor permeable air barrier membrane system, suitable for open joint cladding where designs allow for permanent UV exposure.
- B. Complete Work as shown on the Drawings and specified herein to bridge gaps and seal the water-resistive vapor permeable air barrier membrane against air leakage and water intrusion.
 - 1. Connections of the walls to the roof membrane
 - 2. Connections of the walls to the foundations
 - 3. Seismic and expansion joints
 - 4. Openings and penetrations of window and door frames, store front, curtain wall
 - 5. Piping, conduit, duct and similar penetrations
 - 6. Masonry ties, screws, bolts and similar penetrations
 - 7. All other air leakage pathways in the building envelope
- C. Install primary water-resistive vapor permeable air barrier, flashings, lap integrated seam tapes, sealants, and all related accessories as required by the manufacturer to achieve a continuous air barrier assembly.

1.3 SUBMITTALS

- A. 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.

- B. Shop Drawings: Submit plan, section, elevation and perspective drawings necessary to describe and convey the layout, profiles and product components, including edge conditions, panel joints, fixture location, anchorage, accessories, finish colors, patterns and textures.
- C. Code Compliance (Exterior Panels): Documents showing product compliance with local building code shall be submitted. These documents shall include, but not be limited to, appropriate Evaluation Reports and/or test reports supporting the use of the product. Alternate materials must be approved by the Architect and Resident Engineer.
- D. Engineering Calculations (Exterior Panels): Submit engineering calculations as required by the local building code, showing that the installed panels and attachments system meets the wind load requirements for the project.
- E. Certifications (Water-Resistive Vapor Permeable Air Barrier Sheet)
 - 1. Submit documentation from an approved independent testing laboratory certifying compliance with, a) the resistance to Hydrostatic Pressure, b) ASTM D 828 - Tensile Properties, c) ASTM E 84 - Class A Surface Burning Characteristics, d) ASTM E 96/E 96M - Test Methods for Water Vapor Transmission of Materials, and e) ASTM E 2178 - Standard Test Method For Air Permeance of Building Materials.
 - 2. Submit documentation from an approved independent testing laboratory certifying the membrane meets ICC-ES AC38 - Acceptance Criteria for Water-Resistive Barriers.
- E. Samples:
 - 1. Exterior Panels: For each finish product specified, two samples a minimum of 3.5 inches by 3.5 inches (89 mm by 89 mm) representing actual product, color, and patterns. Sample edges may vary from field panel edges.
 - 2. Water-Resistive Vapor Permeable Air Barrier Sheet and Accessories:
 - a. Manufacturer's sample standard warranty
 - b. Water-resistive vapor permeable air barrier sheet, minimum 8 by 10 inches (203 by 254 mm)
 - c. Components, minimum 12-inch (305-mm) lengths
 - d. Membrane flashings and lap seam tapes
 - e. Fasteners, clips, strapping and masonry ties
 - f. Sealants
- F. Operation and Maintenance Data: Submit operation, maintenance, and cleaning information for products covered under this section.
- G. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 QUALITY ASSURANCE

- A. Exterior Panels:
 - 1. Manufacturer Qualifications: All primary panel products specified in this section will be supplied by a single manufacturer with a minimum of two years experience.
 - a. Products covered under the Work listed in this section are to be manufactured in an ISO 9001 certified facility.
 - 2. Installer Qualifications: All products listed in this section are to be installed by a single installer trained and approved by the manufacturer or representative.
 - 3. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

- B. Water-Resistive Vapor Permeable Air Barrier Sheet and Accessories:
 - 1. Single Source: Water-resistive vapor permeable air barrier membrane components and accessories must be obtained as a single-source membrane system to ensure total system compatibility and integrity.
 - 2. Manufacturer Qualifications
 - a. Manufacturer of specified products listed in this Section to have minimum 2 years of continued experience in the manufacture and supply of highly vapor permeable water resistive air barrier products successfully installed in similar project applications.
 - b. Manufacturer of specified products listed in this Section to have experienced in-house technical and field observation personnel qualified to provide expert technical support.
 - C. Fire Performance Characteristics: Provide water-resistive, vapor permeable air barrier meeting the following fire-test characteristics.

- C. Mock-Up: If required by Resident Engineer, provide a mock-up for evaluation of the product and application workmanship.
 - 1. Mockup shall include all components of the wall assembly including metal studs, gypsum sheathing, Water-Resistive Vapor Permeable Air Barrier Sheet, aluminum bracketing system and solid phenolic classing system and accessories.
 - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect and Resident Engineer.

- D. Pre-installation Meetings: Conduct pre-installation conference to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's standard warranty requirements.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Exterior Panels:
 - 1. Delivery:
 - a. During transportation, use stable, flat pallets that are at least the same dimension as the sheets.
 - b. Materials shall be packaged to minimize or eliminate the possibility of damage during shipping. Items such as wooden side boards, wooden lid, and spacers or protective sheeting between panels shall be used to protect the panels from surface and/or edge damage.

2. Storage:
 - a. Store products in an enclosed area protected from direct sunlight, moisture and heat. Maintain a consistent temperature and humidity.
 - b. Store products in manufacturer's unopened packaging until ready for installation.
 - c. Stack panels using protective dividers to avoid damage to decorative surface.
 - d. For horizontal storage, store sheets on pallets of equal or greater size as the sheets with a protective layer between the pallet and sheet and on top of the uppermost sheet.
 - e. Do not store sheets, or fabricated panels vertically.
 3. Handling:
 - a. Remove protective film within 24 hours of the panels being removed from the pallet.
 - b. When moving sheets, lift evenly to avoid dragging panels across each other and scratching the decorative surface.
 - c. Remove all labels and stickers immediately after installation.
- B. Water-Resistive Vapor Permeable Air Barrier Sheet and Accessories:
1. Refer to current Product MSDS and/or Product Data Sheets for proper storage and handling.
 2. Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.
 3. Store roll materials flat or on end in original packaging. Protect rolls from direct sunlight and inclement weather until ready for use.
- C. Gypsum Sheathing:
1. Packing and Shipping: Deliver materials to site in manufacturer's original unopened packaging with labels intact.
 2. Storage: Store panels flat in an enclosed shelter providing protection from damage and exposure to the elements.

1.5 PROJECT/SITE 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.
- B. Field Measurements: Verify actual measurements/openings by field measurements performed by the installer prior to release for fabrication. Recorded measurements to be indicated on shop drawings based on field measurements provided by the installer. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.6 WARRANTY

- A. Exterior Panels: At project closeout, provide manufacturer's standard 10 year warranty covering defects in materials. Warranty only available when material installed by an installation contractor trained and approved by the manufacturer's representative.
- B. Water-Resistive Vapor Permeable Air Barrier Sheet and Accessories:
 1. Provide manufacturer's standard material warranty in which manufacturer agrees to provide replacement material for water-resistive vapor permeable air barrier sheets installed in accordance with manufacturer's instructions that fails due to material defects within 20 years of the date of Purchase.
 2. Warranty shall include removal and reinstallation of exterior panels.

- C. Gypsum Sheathing:
 1. Provide products that offer twelve months of coverage against in-place exposure damage (delamination, deterioration and decay).
 2. Manufacturer's Standard Warranty: Five years against manufacturing defects.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Exterior Panels: Specifications are based upon Meteon FR Panels with exposed fastener system using 1" tall extruded aluminum hat channel provided by Trespa North America, Ltd, 800-487-3772 or equal.
 1. Represented locally by W.H. Steele Co., 909-930-0831. A list of approved fabricators that provide the system specified in this section as judged and approved by the Architect and Resident Engineer may be acquired from the above.
- B. Water-Resistive Vapor Permeable Air Barrier Sheet: Water-resistive vapor permeable air barrier membrane by VaproShield LLC., Gig Harbor, WA, Ph (866) 731-7663, Email: info@VaproShield.com, Website: www.vaproshield.com or equal.
- C. Gypsum Sheathing: Georgia-Pacific Gypsum LLC or equal.

2.2 MATERIALS

- A. General
 1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 2. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
- B. Exterior Panels (Basis of design):
 1. Solid panel manufactured using a combination of high pressure and temperature to create a flat panel created from thermosetting resins, homogenously reinforced with wood-based fibers and an integrated decorative surface or printed decor.
 2. Panel Thickness: To be determined by grid design.
 3. Color: "Rusty Red".
 - a. Single Sided, black on back.
 4. Finish: Satin.
 5. Panel Core: Fire retardant (FR) black core.
 6. Physical Properties:
 - a. Modulus of Elasticity: 1,300,000 psi (9000 N/mm²) minimum, ISO178.
 - b. Tensile Strength: 10,100 psi (70 N/ N/mm²) minimum, ISO527-2.
 - c. Flexural Strength: 14,500psi (120 N/ N/mm²) minimum, ISO178.
 - d. Thermal Conductivity: 2.1 BTU/inch/ft².hr.°F, EN 12524.
 - e. Structural Performance (ASTM E330):
 - 1) Panels shall be designed to withstand the Design Wind Load based upon the local building code, but in no case less than 15 pounds per square foot (psf). Wind load testing shall be done in accordance with this standard to obtain the following results:
 - 2) Normal to the plane of the wall, the maximum panel deflection shall not exceed L/175

- 3) Normal to the plane of the wall between supports, deflection of the aluminum sub-framing members shall not exceed L/175 or 3/4 inch, whichever is less
 - 4) At 1-1/2 times design pressure, permanent deflection of framing members shall not exceed L/100 of span length and components shall not experience failure or gross permanent distortion.
 - 5) If system tests are not available, mock ups shall be constructed and tests performed under the direction of an independent third party laboratory which show compliance to the minimum standards listed above.
7. Fire Performance:
- a. Flame Spread: Class A, ASTM E 84.
 - b. Smoke Development: Less than 450, ASTM E 84.
 - c. Ignition Temperature: Greater than 650 degree F (350 degree C) above ambient, ASTM D1929.
 - d. Burning Classification: CC1 or CC2, ASTM D635.
 - e. When required for compliance with local building codes, the wall cladding assembly shall show no degradation of the rating of Fire Resistant Assemblies, ASTM E119.
 - f. When required for compliance with local building codes, the wall cladding assembly shall meet the performance requirements for Multi Story construction, NFPA 285.
 - g. When required for compliance with local building codes, the wall cladding assembly shall not ignite when exposed to a radiant heat energy source, NFPA 268.
8. Finish Performance: Electron Beam Cure resin in conformance with the following general requirements:
- a. Color: As selected by the Architect and Resident Engineer from manufacturer's standard colors or a custom color to be matched by the panel supplier.
 - b. Humidity Resistance: No formation of blisters when subjected to condensing water fog at 100% relative humidity and 100 degree F (38 degree C) for 3000 hours, ASTM D 2247.
 - c. Salt Spray Resistance: Corrosion creepage from scribe line (1/16 inch (1.6 mm) max.) and minimum blister rating of 8 within the test specimen field, ASTM B117.
 - d. Weather Exposure: Accelerated - 3000 hours in Atlas Type Weatherometer using cycle of 90 minutes light and 30 minutes diminished light and demineralized water with a maximum color change of 5 Delta E units from the original color according to ASTM D-2244, with the exception of Uni-Colors A12.3.7 / A18.3.5 / A04.1.7, which will not deviate more than 10 Delta E units from original color according ASTM D-2244.
 - e. Color Stability: The decorative surface comply with, classification, 4 - 5 measured with the grey scale according to ISO 105 A02-93 according to test method EN 438-2:29.
 - f. Microbial Characteristics: Will not support micro-organic growth (ISO 846).

9. LEED Requirements: Material provided under this section shall qualify for the following credits:
 - a. MRc4 - Recycled Content: Panel materials shall consist of 15% post-industrial waste.
 - b. MRc 5 - Local/Regional Materials: Materials shall be manufactured within a 500 mile radius of the project site.
 - c. MRc6 - Rapidly Renewable Resources: : Panel materials shall be 70% rapidly renewable.
 - d. IEAc 4.4: Panel shall not contain urea-formaldehyde.

- B. Mounting System to be TS110 - Exposed fastening on fixed depth aluminum sub-framing.

- C. Façade Panel Framing: Aluminum sub-structure shall be designed to withstand structural loading due to wind load and the dead load of the panel, and shall be painted as required to conceal behind the open joinery of the attachment system.
 1. Extrusions, formed members, sheet, and plate shall conform with the recommendations of the manufacturer.

- D. Extruded Aluminum Trim: Color as specified in the finish schedule.

- E. Fasteners: Fasteners shall be non-corrosive and as recommended by panel manufacturer. Exposed fasteners shall be colored to match panels where required by the Architect and Resident Engineer.

- F. Water-Resistive Vapor Permeable Air Barrier Sheet and Accessories:
 1. Primary water-resistive air barrier sheet membrane shall be RevealShield® Water-Resistive Vapor Permeable Air Barrier Sheet by VaproShield or equal, a zero VOC mechanically attached water-resistive, vapor permeable air barrier sheet membrane consisting of multiple layers of UV stabilized material with integrated tape at horizontal seams, having the following properties:
 - a. Color: Black with allowable UV exposure for 120 days total before being covered by cladding
 - b. Air Leakage: < 0.00004 cfm/sq.ft. (0.0002 L/s/sq.m) when tested in accordance with ASTM E 2178 and < 0.000034 cfm/sq.ft. (0.00017 L/s/sq.m) when tested in accordance with ASTM E 283.
 - c. Water Vapor Permeance tested to ASTM E 96 Method B: 42 perms (262.6 g/m²)
 - d. Water Resistance tested to AATCC 127, 550 mm hydrostatic head for 5 hours: No leakage
 - e. Tensile Strength tested to ASTM D 828: 44.8 lbf/inch (68 N/mm), machine direction; 21.3 lbf/inch (37.3 N/mm), cross-machine direction
 - f. Application Temperature: No temperature restrictions
 - g. Surface Burning Characteristics tested to ASTM E 84: Class A, Flame-spread index of less than 10, Smoke-development index of less than 135
 - h. Physical Dimensions: 0.020 inches (0.51 mm) thick and 59 inches (1.5 m) wide and 5 oz per sq. yd. (170 g/sq.m).
 2. Water-Resistive Air Barrier Sheet Membrane Fasteners
 - a. Water-resistive air barrier sheet membrane fasteners shall be corrosion-resistant or stainless steel screws of #6, 7, or 8, bugle-head design.
 - b. Screw head caps for water-resistive air barrier sheet membrane shall be VaproCaps by VaproShield or equal, a 1¼ inch diameter preformed head caps with a center throat hole that seals the membrane at the fastener penetration, specifically designed and tested to withstand wind loads and protect against water intrusion at screw penetrations.

- c. Selection of fastener thread type is subject to sheathing board and substrate type. Manufacturer recommends subcontractor to supply and place corrosion-resistant or stainless steel screws sized to penetrate gypsum sheathing board through to solid backing or steel studs or wood sheathing by $\frac{3}{4}$ inch in conjunction with preformed screw headcaps.
 3. Water-Resistive Air Barrier Joint Sealant: Water-resistive air barrier sealant compatible with sheet membrane shall be Dow Corning® 758 or equal, a modified silicon-based Sealant tested for compatibility with VaproShield products.
 4. Water-Resistive Air Barrier Transition and Flashing Membranes: Mechanically attached air barrier transition and flashing membrane shall be RevealFlashing™ by VaproShield or equal, a Black, highly UV stable, zero VOC mechanically attached water-resistive vapor permeable membrane having the following properties:
 - a. RevealFlashing™: 6 1/2 inches, 11 3/4 inches or 19 2/3 inches wide x 164 feet long
 - b. Air Leakage: < 0.0000263 cfm/sq. ft. @ 75 Pa (0.000134 L/s/m sq @ 75 Pa) when tested in accordance with ASTM E2178
 - c. Water Vapor Permeance tested to ASTM E 96 Method B: 42 perms (2875ng/Pa.s.m²)
 - d. Water Resistance tested to AATCC 127, 550 mm hydrostatic head for 5 hours: No leakage
 5. Water-Resistive Flashing and Penetration Tapes: VaproTape™ by VaproShield or equal: UV stable, single sided, moisture-resistant flexible tape with adhesive backing having the following properties:
 - a. VaproTape UV-Resistant Black: 35 mil thick by 4 inches (102 mm) wide penetration seam tape
 - b. VaproAlumaTape: 20 mil thick by 4.5 inches (114 mm) and 9 inches (229 mm) wide, foil faced, UV stable, moisture-resistant flashing and membrane transition tape for use with silicone sealants
 6. Vaproliqui-Flash™ Vapor Permeable Water Resistive Flashing or equal for Rough Openings: Window and door flashing shall be VaproLiqui-Flash by VaproShield, a liquid-applied vapor permeable air barrier flashing material with vapor permeance and resistance to air leakage properties compatible with the primary air barrier membrane.
 7. Sill Pan Protection System: Extruded PVC sections with integral sloped shape, preformed corner dams and window unit spacer supports configured to drain moisture from window unit base to exterior shall be VaproSillSaver™ by VaproShield or equal. Coordinate selection of sill pan depth with window unit frame size. VaproSillSaver is designed for use with nail flanged equipped windows only.
 8. Water-Resistive Weather Barrier Batten and Ventilation Accessories: As manufactured by VaproShield made of black PVC material
 - a. VaproBatten™ or equal: Black vinyl extrusion with pre-formed fastener and moisture drainage channels configured to create a ventilated airspace between wall cladding and weather-resistive barrier. VaproVent™ L Strip and VaproVent™ Hook Strip not necessary in typical open joint cladding systems.
 9. Penetration Sealant: Provide sealant for penetrations as recommended by manufacturer and as specified under Division 07 Section: Sealants. Appropriate sealants shall be Dow 758 or VaproLiqui-Flash or equal.
- G. Gypsum Sheathing: Fire-Rated Fiberglass-Mat Faced Gypsum Sheathing conforming to ASTM C1177, Type X:
1. Thickness: 5/8 inch.
 2. Width: 4 feet.
 3. Length: 8 feet, 9 feet or 10 feet as applicable to project requirements.

4. Weight: 2.5 lb/sq. ft.
5. Edges: Square.
6. Surfacing: Fiberglass mat on face, back, and long edges.
7. Racking Strength (Ultimate, not design value) (ASTM E72): Not less than 654 pounds per square foot, dry.
8. Flexural Strength, Parallel (ASTM C1177): 100 lbf, parallel.
9. Humidified Deflection (ASTM C1177): Not more than 1/8 inch.
10. Permeance (ASTM E96): Not more than 17 perms.
11. R-Value (ASTM C518): 0.67.
12. Mold Resistance (ASTM D3273): 10, in a test as manufactured.
13. Microbial Resistance (ASTM D6329, GREENGUARD 3-week protocol): Will not support microbial growth.
14. Acceptable Product: 5/8 inch DensGlass Fireguard Sheathing, Georgia-Pacific Gypsum or equal
15. Fasteners: ASTM C1002, corrosion resistant treated screws.

2.3 FABRICATION

- A. Panels: Solid phenolic impregnated Kraft paper wall panels with no voids, air spaces or foamed insulation in the core material. Accessory items in accordance with manufacturer's recommendations and approved submittals.
- B. Panel Weight: 8 mm (2.4 lb/ft²), 10 mm (3 lb/ft²), 13 mm (3.8 lb/ft²).
- C. Panel Bow: ≤ 2 mm / m (≤ 0.079 inch/39.38 inches).
- D. Panel Dimensions: Field fabrication shall be allowed where necessary, but shall be kept to an absolute minimum. All fabrication shall be done under controlled shop conditions when possible.
- E. Appearance: Panel lines, breaks, and angles shall be sharp, true, and surfaces free from warp and buckle.
- F. All panel-exposed edges shall be square cut, with an eased edge.

2.4 SOURCE QUALITY CONTROL

- A. Panels to be U.L. registered and labeled for quality consistency.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Preconstruction Conference: A conference shall be held at the jobsite prior to start of construction of this portion of the work to review substrates, flashing conditions, work provided by preceding trades and work required by trades following this work. General Contractor, subcontractor(s) affected by the work of this section, Architect and Resident Engineer shall be in attendance. If required, modifications shall be made to details and to specifications to address actual field conditions.

- B. Gypsum Sheathing:
1. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
 2. Verify that surface of framing members do not vary more than 1/4 inch from the plane of faces of adjacent members.
 3. Coordination: Coordinate with other work which affects, connects with, or will be concealed by this Work.
- C. Water-Resistive Vapor Permeable Air Barrier Sheet and Accessories:
1. Verify that surfaces and conditions are ready to accept the Work of this section. Notify Resident Engineer in writing of any discrepancies. Commencement of the Work or any parts thereof shall mean acceptance of the prepared substrates.
 2. All surfaces must be sound, clean and free of oil, grease, dirt, excess mortar or other contaminants detrimental to the adhesion of the water resistive air barrier flashings. Fill voids, gaps in substrate to provide an even surface. Strike masonry joints full-flush.
 3. Minimum application temperature self-adhered membrane flashings to be above 20 degrees F (minus 6.0 degrees C).
 4. Ensure all preparatory Work is complete prior to applying primary water-resistive weather barrier membrane.
 5. Mechanical fasteners used to secure sheathing boards or penetrate sheathing boards shall be set flush with sheathing and fastened into solid backing.
- D. Exterior Panels:
1. Do not begin installation until substrates have been properly prepared.
 2. Surfaces to receive panels shall be even, smooth, dry, and free from defects detrimental to the installation of the panel system. Notify Contractor in writing of conditions detrimental to proper and timely completion of the work.
 3. Confirm exterior sheathing is plumb and level, with no deflection greater than 1/4 inch (6 mm) in 20 feet (6096 mm).
 4. Weather resistant barrier shall be accepted by panel manufacturer prior to beginning of installation of panel system.
- E. Coordination with other Work: Coordinate with other work which affects, connects with, or will be concealed by this Work.

3.2 INSTALLATION

- A. Gypsum Sheathing: In accordance with GA-253, ASTM C1280 and the manufacturer's recommendations and IBC requirements.
1. Verify that surface of framing members do not vary from more than 1/4 inch from the plane of faces of adjacent members.
 2. Panels of the maximum length possible shall be used to minimize the number of joints. Edge joints must be located parallel to and with vertical orientations on framing. End joints of adjacent lengths of sheathing must be staggered.
 3. Cut board at penetrations, edges and other obstructions; and fit tightly against abutting construction, unless otherwise indicated.
 4. Fasteners must be driven so as to bear tight against and flush with surface of sheathing, but do not cut into facing. Fasteners must not be countersunk.
 5. Do not bridge building expansion joints with sheathing; cut and space edges to match spacing of structural support elements.
 6. Fasteners must be located a minimum of 3/8 inch from edges and ends of sheathing panels.

- B. Water-Resistive Vapor Permeable Air Barrier Sheet and Accessories:
1. Install in accordance with manufacturer's printed instructions.
 2. Membranes shall be installed as continuous membrane, sealed back to the substrate or exterior sheathing around the perimeter edges of the walls and all lap seams.
 3. Install accessories as required by manufacturer's installation instructions.
 4. Sealant at seams shall be Dow 758.
- C. Exterior Panels
1. Install solid phenolic wall panels and sub-frame system in accordance with manufacturer's instructions.
 2. Install solid phenolic wall panels plumb and level and accurately spaced in accordance with manufacturer's recommendations and approved submittals and drawings.
 3. Anchor panels and sub-framing securely per engineering recommendations and in accordance with approved shop drawings to allow for necessary movement and structural support.
 4. Fasten solid phenolic wall panels with fasteners approved for use with supporting substrate.
 5. Do not install panels or component parts which are observed to be defective or damaged including, but not limited to: warped, bowed, abraded, scratched, and broken members.
 6. Do not cut or trim component parts during installation in a manner that would damage the finish, decrease the strength, or result in visual imperfection or a failure in performance. Return component parts with require alteration to the shop for re-fabrication or replacement.
 7. Install corner profiles and trim with fasteners appropriate for use with adjoining construction as indicated on the Contract Drawings and as recommended by manufacturer.
 8. Installed panels shall have open joints of 3/8" - 1/2". Exact sizes and dimensions to be coordinated with the drawings, field conditions and approved shop drawings.
 - a. The vertical joints are to appear open, but have the black sub frame assembly directly behind joints, in effect closing the joint.
 - b. The horizontal joints are open.
 9. Outside corner profiles to be "open joint".
 10. Every vertical section of the façade cladding shall have a ventilation opening at the bottom and top, having a width / depth of 2.36 square inch / foot (50 cm²/m).
 11. Opening between bottom of façade and the structural wall shall be covered by ventilation profile to prevent animals or other objects from being hidden behind the panels. The perforation grade needs to meet the openings per area in accordance to point F (2.36 square inch / foot).
 12. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - a. Site Visits: At least twice per month during exterior system installation.

3.5 ADJUSTING AND CLEANING - EXTERIOR PANELS

- A. Adjust final panel installation so that all joints are true and even throughout the installation. Panels out of plane shall be adjusted with the surrounding panels to minimize any imperfection.

- B. Repair panels with minor damage. Remove and replace panels damaged beyond repair as a direct result of the panel installation. After installation, panel repair and replacement shall become the responsibility of the General Contractor.
- C. Remove any masking or panel protection as soon as possible after installation. Any masking intentionally left in place after panel installation on an elevation, shall become the responsibility of the General Contractor.
- D. Construction Waste: In accordance with Section 01 74 19.

3.6 PROTECTION

- A. Water-Resistive Vapor Permeable Air Barrier Sheet:
 - 1. Protect wall areas covered with primary water-resistive vapor permeable air barrier from damage due to construction activities, high wind conditions, and extended exposure to inclement weather.
 - 2. Review condition of water-resistive weather barrier prior to installation of cladding. Repair, or remove and replace damaged sections with new membrane.
 - 3. Recommend to cap and protect exposed back-up walls against wet weather conditions during and after application of membrane, including wall openings and construction activity above completed primary water-resistive weather barrier installations.
 - 4. Remove and replace water-resistive vapor permeable air barrier affected by chemical spills or surfactants.
- B. After installation, the General Contractor shall protect the wall panel system from damage. The panels shall be kept free from paint, plaster, cement scratches, or any other destructive forces.

END OF SECTION

SECTION 07 53 10

ELASTOMERIC SINGLE-PLY MEMBRANE ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Section - 01351

1.2 SUMMARY

- A. This Section includes mechanically fastened Thermoplastic Olefin (TPO) and Ethylene Propylene Diene Monomer (EPDM) sheet roofing and insulation system.

1.3 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.
- C. Samples: For each product included in membrane roofing system.
- D. Manufacturer's Certification letter indicating that the membrane meets the minimum required thickness as specified (i.e. TPO: 40.5 mil minimum thickness and 13 mils minimum thickness over the scrim).
- E. Maintenance data
- F. Provide manufacturer's data on the post-consumer and post-industrial recycled content of the materials of this section.
- G. Provide manufacturer's data highlighting the address of the manufacturer of the materials of this section
- H. Provide manufacturer's data highlighting the locations of extraction/harvest of the raw materials used in the manufacturing of the material of this section.
- I. Provide data highlighting the VOC (Volatile Organic Compound) content of all adhesives and sealants used in this work per the South Coast Air Quality Management District (SQAMD) Rule #1168 AND all sealants used as fillers must not exceed the VOC limits of the Bay Area Quality Management District Regulation #8, Rule #51 for all exposed membrane roofing.

1.4 QUALITY ASSURANCE

- A. The roofing system must be installed by an authorized manufacturer's roofing contractor with a minimum of 24 months experience installing the selected membrane. Contractor shall submit a written certification from the manufacturer indicating current authorization. Contractor shall submit to Owner a copy of the shop drawings as approved by the manufacturer prior to installation. Any unusual conditions (as defined by the manufacturer)

which could be reasonably anticipated by the Contractor must be reviewed by the manufacturer's technical department prior to bidding. Special requirements by the manufacturer, e.g., fully adhered membrane at wind-resistive areas of the roof, will generally be acceptable to Lowe's.

- B. **Installer Qualifications:** A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
- C. **Source Limitations:** Obtain components for membrane roofing system from same manufacturer as roofing membrane.
- D. **Fire-Test-Response Characteristics:** Provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by Underwriters Laboratories, Inc. (UL), Factory Mutual Guide (FMG), or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. **Exterior Fire-Test Exposure:** Class A; ASTM E 108, for application and roof slopes indicated.
- E. **Preinstallation Conference:**
 - 1. Contractor shall have a pre-installation conference one (1) week prior to commencing work on this Section. Notify Owner at least two (2) weeks in advance of this date. Required attendees will be roof installer, deck installers, Contractor, roofing manufacturer's technical representative and Owner. The agenda shall include:
 - a. Where possible, tour representative areas of roofing substrates (decks), and discuss substrate condition. Contractor shall provide owner a copy of the approved manufacturer Pre-installation Notice prior to roofing.
 - b. Review contract documents, submittals, status of coordinating work, availability of materials and installation facilities, proposed installation schedule, requirements for inspections and testing or certification, forecasted weather conditions, governing regulations, insurance requirements and proposed installation procedures.
 - c. Record discussion including agreement or disagreement on matters of significance; furnish copy of recorded discussions to each participant.
 - d. Discuss roofing system protection requirements for construction period extending beyond roofing installation. If meeting ends with substantial disagreements, determine how disagreements will be resolved and set date for reconvened meeting.
 - e. No smoking will be allowed on roof once membrane installation has begun.

1.5 PROJECT CONDITIONS

- A. **Weather Limitations:** Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.
- B. **Environmental Requirements:**
 - 1. Contact adhesives and primer are extremely flammable. Avoid open flame, sparks or smoking while handling.
 - 2. All surfaces to be adhered must be dry before and throughout entire application.
 - 3. Do not apply membrane during inclement weather. When air temperature is below freezing consult Manufacturer's Technical Department for special techniques.

- C. Examination: Verify that deck/substrate is dry, clean, smooth and free of sharp edges, burrs, loose material, oil, grease, or other foreign matter. Beginning installation means acceptance of substrate.

1.6 WARRANTY

- A. Contractor shall provide to Owner a 20 year "Total System" Material and Labor Warranty/Guaranty issued by the roofing manufacturer. The warranty shall guarantee against all material defects and faulty workmanship of all materials, including insulation, installed by the roofing subcontractor as required by these specifications for the full

duration of the warranty. The warranty must carry a wind uplift coverage of 72 m.p.h. peak gust wind speed measured at 10 meters above ground level. The warranty shall commence upon the Final Acceptance of the roofing system.

PART 2 - PRODUCTS

2.1 ELASTOMERIC SINGLE-PLY MEMBRANE ROOFING

- A. TPO Mechanically Fastened Membrane:
 - 1. The roofing manufacturer shall furnish all TPO non-halogenated, elastomeric sheet roofing, roof insulation, walk pads, fastening plates, sealants, flashing, tapes, bonding adhesives, and all accessories necessary for a complete insulated elastomeric sheet roofing system. Factory seamed membranes are acceptable.
 - 2. Manufacturers:
 - a. The GenFlex TPO Mechanically Attached System manufactured by GenFlex Roofing Systems, 1722 Indian Wood Circle, Maumee, OH 43537.
 - b. The Stevens EP Mechanically Fastened Roofing System, manufactured by Stevens Roofing Systems, Nine Sullivan Road, Holyoke, MA 01040.
 - c. The Sure-Weld TPO Mechanically Fastened Roofing System manufactured by Carlisle SynTec Incorporated, 1285 Ritner Highway, Carlisle, PA 17013.
 - d. The Ultraply TPO Mechanically Anchored Roofing System manufactured by Firestone Building Products, 525 Congressional Blvd., Indianapolis, IN 46032.
 - 3. Thickness 45mils nominal reinforced, but a minimum requirement of 40.5mils thickness is required. Provide a minimum thickness for the top layer of 13 mils over the scrim as tested in accordance with ASTM D751.
 - 4. Exposed face Color: White (See Bid Form for Alternate pricing for Charcoal/Gray color).
- B. EPDM Roofing Membrane (Alternate Bid): ASTM D 4637, Type I, nonreinforced or II, scrim or fabric internally reinforced uniform, flexible sheet made from EPDM, and as follows:
 - 1. The roofing manufacturer shall furnish or approve all EPDM elastomeric sheet roofing, roof insulation, walk pads, fastening plates, sealants, flashing, seam tape, splicing cement, lap sealant and all accessories necessary for a complete insulated elastomeric sheet roofing system. Factory seam membranes are acceptable.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.
 - a. The GenFlex EPDM Mechanically Attached System manufactured by GenFlex Roofing Systems, 1722 Indian Wood Circle, Maumee, OH 43537.

- b. The Rubbergard Mechanically Anchored Roofing System manufactured by Firestone Building Products, 525 Congressional Blvd., Indianapolis, IN 46032.
 - c. The Sure-Seal Mechanically Fastened Roofing System manufactured by Carlisle SynTec Incorporated, 1285 Ritner Highway, Carlisle, PA 17013.
 - 3. Thickness: 45 mils, nominal.
 - 4. Exposed Face Color: Black.
- C. Materials in this section to have at least 5-10% recycled content (post consumer material cost + .5 pre-consumer material cost) to meet the requirements established by LEED v2.1 Materials and Resources credit(s)4.1/4.2
- D. At least 20% of the materials in this section to be manufactured within 500 miles of the project site.
- E. All roofing material must achieve an emissivity of at least 0.9 per ASTM 408 testing procedure.

2.2 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
- B. Sheet Flashing: 45 mils nominal thick EPDM, partially cured or cured, according to application.
 - 1. Flashing: Install flashing as shown in the Manufacturer's Roofing Systems Manual – Drawing details. When possible, all flashing is to be completed as the roof membrane installation progresses to ensure that no water entry occurs into the completed sections, at those points.
- C. Bonding Adhesive: Manufacturer's standard bonding adhesive.
- D. Roof Membrane and Seaming: Install roof membrane according to the Manufacturer's Roofing System Manual – Mechanically Attached System Installation Guide and Drawing Details. Field splices shall be accomplished using manufacturer's tape (EPDM) or automatic hot-air welder (TPO). Contractor shall assure that the splicing system is installed in strict accordance with the manufacturer's requirements given the actual field conditions. Complete sealing of all splices by the end of each work day. Care should be exercised at the end of each work day to ensure that water does not flow beneath completed sections of roofing system.
- E. Fasteners: Factory-coated steel fasteners and metal or plastic plates or batten bars meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
- F. Miscellaneous Accessories: Provide lap sealant, water cutoff mastic, termination bars, battens, pourable sealers, premolded cone and vent sheet flashings, premolded inside and outside corner sheet flashings, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.
- G. Flashing/Fascia: Install gravel stop/fascia, wall cap, reglet and drip edge base rail as shown on drawings.

2.3 ROOF INSULATION

- A. Roof deck insulation shall be rigid board polyisocyanurate insulation approved by the roofing manufacturer, providing a minimum 3 inch thickness (unless otherwise indicated on drawings), and furnished and installed by roofing subcontractor. All roof deck insulation shall comply with Factory Mutual Standard 4450 or Underwriters' Laboratories Subject 1256 and noted for use in roofing assemblies only.
- B. Polyisocyanurate Board Insulation: Rigid, cellular polyisocyanurate thermal insulation with core formed by using non-HCFC's as blowing agents to comply with revised ASTM C1289-02, "Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board" (effective January 1, 2003), including Long Term Thermal Resistance compliance. Board insulation shall be classified by facer type as follows:
 - 1. Facer Type: Type II, felt or glass-fiber mat on both major surfaces.
- C. Install per insulation manufacturer's requirements. Fit insulation tightly to nailers and penetrations. Fill voids larger than ¼ inch with insulation. Position boards so that end joints are staggered and edges are supported by the roof deck.
- D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.4 INSULATION ACCESSORIES

- A. Mechanically Fastened Roofing System (Fasteners): Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.

2.5 WALKWAYS

- A. Install walkpads in locations indicated on drawings. For EPDM roofs, adhere to membrane with seam tape or other suitable material as approved by Manufacturer. For TPO roofing, walkpads to be hot air welded or adhered to the roof membrane per manufacturer's recommendations. Walkpads to match color of roofing membrane.

PART 3 - EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original, unopened containers. Containers are to be labeled with manufacturer's name, brand name, installation instructions and identification of various items.
- B. All materials, except membrane, must be stored between 60 degrees F and 80 degrees F. If exposed to lower temperatures, restore materials to 60 degrees F minimum temperature before using.
- C. All materials must be stored in a dry area and protected from water. All materials, except membrane, must be protected from direct sunlight. Damaged materials shall be replaced at roofing subcontractor's expense.

3.2 INSULATION INSTALLATION

- A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

- B. Comply with membrane roofing system manufacturer's written instructions for installing roof insulation.
- C. Install one or more layers of insulation under area of roofing to achieve required thickness (as specified on drawings).
- D. Mechanically Fastened and Adhered Insulation: Install each layer of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - 1. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.

3.3 MECHANICALLY FASTENED ROOFING MEMBRANE INSTALLATION

- A. Install roofing membrane over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.
- B. Roofing system shall be designed and installed in accordance with wind load requirements, and codes in accordance with the authorities having jurisdiction.
- C. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel.
- D. Accurately align roofing membranes and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- E. Mechanically or adhesively fasten roofing membrane securely at terminations and perimeter of roofing.
- F. Adhesive Seam Installation: According to roofing system manufacturers written instructions.
- G. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing membrane terminations.
- H. Repair tears, voids, and lapped seams in roofing that does not meet requirements.
- I. In-Splice Attachment: Secure one edge of roofing membrane using fastening plates or battens centered within membrane splice and mechanically fasten roofing membrane to roof deck. Field-splice seam.
- J. Through-Membrane Attachment: Secure roofing membrane using fastening plates or battens and mechanically fasten roofing membrane to roof deck. Cover battens and fasteners with a continuous strip. Maximum spacing between rows of fasteners shall be 7'-0" for non-reinforced EDPM membrane and 10'-0" for reinforced EDPM membrane and maximum spacing of fasteners shall be 12 inches center to center. For TPO membranes the maximum spacing between rows of fasteners shall be 10'-0". Maximum spacing of fasteners for TPO membranes measuring up to 80 inches shall be 18 inches center to center. Maximum spacing of fasteners for TPO membranes measuring from 80 inches to 120 inches shall be 12 inches center to center. For TPO membranes the maximum spacing between rows of fasteners may be increased to 12'-0" provided a dual (two 1½" welds, one

on each side of the securement plates) weld seam assembly is utilized with fasteners spaced a maximum of 12" center to center.

3.4 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. 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.

3.5 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products in locations indicated. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform roof tests and inspections and to prepare test reports.
- B. Roof Inspection: Upon completion of the installation, an inspection shall be conducted by a technical representative of the manufacturer to ascertain that the roofing system has been installed according to manufacturer's most current published specifications and details.
- C. A follow-up inspection is to be conducted by a technical representative of the manufacturer 16-20 months after the warranty is issued to assure compliance of all parties to the warranty requirements. The Owner, Lowe's store maintenance department, and roof installer are to be invited and given a copy of the report generated by that inspection.
- D. Repair or remove and replace components of membrane roofing system where test results or inspections indicate that they do not comply with specified requirements.

END OF SECTION

SECTION 07 60 00

FLASHING AND SHEET METAL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Flashings, sheet metal work and related items including, but not limited to:
1. Counterflashing at vertical surfaces.
 2. Flashing at roof penetrations.
 3. Edge flashing.
 4. Sheet metal scuppers, gutters and downspouts.
 5. Metal copings.
 6. Sump pans.

1.2 SUBMITTALS

- A. Shop Drawings: Submit Drawings indicating type of material, gage, dimensions, profiles, locations where used, fastening and anchoring methods, joints, and provisions of expansion and contraction.
- B. Samples: Submit samples of each type of prefinished metal in selected color(s).
- C. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 QUALITY ASSURANCE

- A. Standards:
1. Comply with design and installation methods of SMACNA Architectural Sheet Metal Manual.
 2. Comply with The NRCA Roofing and Waterproofing Manual installation details.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Storage: Adequately protect against damage while stored at the site.
- C. Handling: Comply with Manufacturer's instructions.

PART 2 PRODUCTS

2.1 MATERIALS

- A. General
 - 1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 - 2. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.

- B. Materials:
 - 1. Prefinished Metal (Polyvinyl Fluoride):
 - a. Hot-dipped galvanized, ASTM A653 Structural Quality, Grade 40, G90 coating 20 gauge core steel, or prefinished Galvalume - ASTMA792.
 - b. Finish: Full strength Kynar 500/Hylar 5000 fluoropolymer coating, applied by the Manufacturer on a continuous coil coating line, with top side dry film thickness of 0.70 to 0.90 mil over 0.25 to 0.35 mil prime coat, to provide a total dry film thickness of 0.95 to 1.25 mil. Color as selected by Architect and Resident Engineer from manufacturer's full range of colors.
 - 2. Bonderized Galvanized Steel: ASTM A653, 20 gauge minimum and as indicated, with G-60 coating which has been put through a phosphate bath and chromate drying process leaving it ready to accept paint.
 - 3. Reglets and Counterflashings: Fabricated from stainless steel. Fry Reglet Corporation, Type SM at masonry and Concrete, or fabricated as indicated on Drawings. Provide prefabricated inside and outside reglet and counterflashing corners.

- C. Galvanized Steel: ASTM A653, 24 gauge minimum and as indicated with G-60coating.

2.2 ACCESSORIES

- A. General
 - 1. Provide recycled materials (for accessories) in accordance with Recycled Content provisions of Section 01 60 00.
 - 2. Provide local/regional materials (for accessories) in accordance with Local/Regional Materials provisions of Section 01 60 00.

- B. Reglets and Counterflashings: Fry Reglet Corporation, Type STX at stucco, Type SM at masonry and Concrete, or fabricated as indicated on Drawings. Provide prefabricated inside and outside reglet and counterflashing corners.

- C. Solder: ASTM B32, 50/50 type.

- D. Flux: FS O-F-506.

- E. Sealant: As specified in Section 07 92 00.

- F. Plastic Cement: ASTM D4586.

- G. Bituminous Coating: FS TT-C-494 or SSPC paint - 12, dry film 15 mils percoat.

- H. Sheet Metal Fasteners:
 - 1. Galvanized steel: Pre-finished galvanized steel with soft neoprene washers at exposed fasteners.
 - 2. Stainless steel: Stainless steel Type 300 series, selected to prevent galvanic action with the components fastened. Where exposed in finished surfaces, use oval-head countersunk cross-headed screws with head diameter one (1) screw size smaller than the shank diameter, finished to match adjacent surfaces.
- I. Prefinished Metal Seam Sealers and Adhesives: As recommended by prefinished metal manufacturer for waterproof and weather-resistant seaming and adhesive applications of flashing and sheet metal work.

2.3 FABRICATION

- A. Fabricate sheet metal with lines, arris, and angles sharp and true, and plane surfaces free from objectionable wave, warp or buckle. Hem exposed edges to form a 1/2 inch wide hem on the side concealed from view.
- B. Fabricate scuppers, gutters and downspouts in accordance with SMACNA Architectural Sheet Metal Manual and as indicated on drawings.
- C. Forming, anchoring, expansion and contraction details, shall conform to referenced quality standards.
- D. Provide for thermal expansion of running trim, flashing, expansion joints, and other items exposed for more than 15 feet continuous length.
- E. Fabricate cleats and starter strips of same material as sheet.
- F. Form pieces in longest practical lengths, except form flashing and facias in 8 to 10 foot units.
- G. Fabricate coping covers with butt seam with backup plate, fastened one side seams (item 19, figure 3-3 per SMACNA Architectural Sheet Metal Manual).
- H. Solder and seal metal joints or use seam sealer/adhesive as recommended by prefinished metal manufacturer. After soldering, remove flux. Wipe and wash solder joints clean by scrubbing, neutralizing with ammonia or a 5 to 10 percent solution of washing soda, followed by a clear water rinse..
- I. Fabricate corners from one piece with minimum 18 inch long legs, with mitered corners; solder for rigidity, seal with sealant.
- J. Fabricate flashings to allow toe to extend 2 inches over roofing. Return and brake edges.
- K. Where prefabricated counterflashing and reglet system is used, form upper edge of counterflashing with an approved snap lock flange to engage reglet receiver and to provide a spring action at bottom edge against built-up flashing.
- L. Flashing Pans: Form sheet metal pans 6 inch nominal square size, with 3 inch upstand, and 4 inch flanges. Fill pans watertight with plastic cement.

2.4 FINISH

- A. Shop prepare and prime exposed ferrous metal surfaces.
- B. Backpaint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 1.5 mil.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
 - 1. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.
 - 2. Verify membrane termination and base flashings are in place, sealed, and secure.
- B. Coordination: Coordinate with other Work which affects, connects with, or will be concealed by this Work.

3.2 INSTALLATION

- A. Installation shall conform to NRCA and SMACNA manuals.
- B. Expansion Seams: Maintain a watertight installation at expansion seams. Locate expansion seams as shown or if not shown, at the following maximum spacing for each general flashing use:
 - 1. Flashing, expansion joints, gravel stops, and trim: At 10 foot intervals, 24 inches on each side of corners and intersections.
 - 2. Sealant-type expansion joints: Where sealant-filled expansion joints are used, embed the hooked flanges of the joint members not less than 1 inch into the sealant. Form joints to completely conceal the sealant. When ambient temperature is moderate at the time of installation (40 to 70 degrees F.), set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant type joints at temperatures below 40 degrees F. Installation of sealant is specified in Section 07 92 00.
- C. Where dissimilar materials abut, provide proper separation or protection to minimize the possibility of galvanic action.
- D. Soldering:
 - 1. Except where other methods of joining are indicated or specified, solder joints and connections of Sheet Metal Work.
 - 2. Remove grease and dirt from metal surfaces to be joined.
 - 3. Remove flux residue by scrubbing, neutralizing with ammonia or a 5 to 10 percent solution of washing soda, followed by a clear water rinse.
 - 4. Assemble parts and solder using regular non-corrosive resin flux. Heat metal thoroughly to completely sweat solder through full contact area.
- E. Reglets: Install reglets in masonry or stucco to receive flashings.

- F. Counterflashing:
 - 1. Provide metal counterflashing at top edges of base flashings and at other locations indicated.
 - 2. Lap end joints a minimum of 3 inches. Do not solder or weld joints. Make flashing continuous at angles. Counterflashing shall overlap base flashing a minimum of 4 inches, unless otherwise indicated.
 - 3. Where counterflashing terminates in reglets, fasten flashing with lead wedges every 12 inches. Fill reglets continuously with synthetic rubber type sealant.

- G. Copings:
 - 1. Cover top of parapet walls where indicated with 24 gage galvanized metal coping formed to design shown. Before applying metal, cover top of wall or wood blocking with polyethylene.
 - 2. Extend front edge of coping covering down over the lock into a previously placed continuous edge strip. Secure edge strips with nails spaced 12 inches apart.
 - 3. Join rear edge of coping covering to adjacent flashings as indicated.

3.3 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

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SECTION 07 72 00
ROOF ACCESSORIES

PART 1 GENERAL

1.1 SUBMITTALS

- A. Product Data: Submit Manufacturer's Specifications, design data and installation instructions.
- B. Shop Drawings: Submit Drawings showing layout, dimensions and construction details.
- C. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.2 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Storage: Adequately protect against damage while stored at the site.
- C. Handling: Comply with Manufacturer's instructions.

1.3 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions shown on Drawings by taking field measurements; proper fit and attachment of parts is required.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Furnish products of one of the following Manufacturers, except as approved by the Architect and Resident Engineer, subject to compliance with Specifications requirements:
 - 1. Bilco Co. www.bilco.com
 - 2. Bristolite www.bristolite.com
 - 3. Cierra Products www.cierraproducts.com
 - 4. J.L. Industries www.jlindustries.com
 - 5. Pate Co. www.patecurbs.com
 - 6. Milcor, Inc. www.milcorinc.com
 - 7. Nystrom Building Products www.nystrom.com
 - 8. O'Keeffe's Inc. www.okeefes.com
 - 9. Acralight International; Div. Of International Skylights (Roof Hatches) www.acralight.com
 - 10. Or equal.

2.2 MANUFACTURED UNITS

- A. General
 - 1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 - 2. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
- B. Roof Hatch: Bilco Type S-20, or as approved. www.bilco.com or equal. Galvanized steel, 14 gage cover and curb, 22 gage cover liner. 1 inch thick rigid insulation in curb and cover, 12 inch high curb.
 - 1. Provide heavy duty padlock hasp.
 - 2. Provide vandal resistant features as available.
 - 3. Finish: Red-oxide primer. Paint finish in accordance with Section 09 91 00.
- C. Curbs: Pate Style pc-1b, or equal, box section design, heavy gage galvanized steel construction, continuous mitered and welded corner seams, integral base plate, factory installed wood nailer, and insulated with 1-1/2 inch thick rigid fiberglass board insulation.
- D. Equipment Supports: Pate Style es-1 or equal, monolithic construction, heavy gage galvanized steel, continuous mitered and welded corner seams, integral base plate, factory installed 2 inch x 4 inch wood nailer, and heavy gage galvanized steel counterflashing.
- E. Pipe Curb Assemblies: Pate Style pca-1 or equal, with curb constructed of heavy gage galvanized steel with continuous welded corner seams, factory installed wood nailer insulated with 1-1/2 inch thick rigid fiberglass board insulation, cover of acrylic clad ABS thermoplastic, including graduated step PVC, boots, adjustable stainless steel clamps and cap fastening screws. Each assembly shall include curb, cap, boots and clamps. See Drawings for size and quantity of pipe penetrations.
- F. Ladder extension (for roof hatches): Bilco Model 1 LadderUP safety post, or Bristolite Grab Bar or equal.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other Work which affects, connects with, or will be concealed by this Work.

3.2 INSTALLATION

- A. Install roof specialties at locations shown or required in accordance with Manufacturer's instructions and as detailed on Drawings.
- B. Install roof hatches, equipment supports and bases, curbs and curb assemblies, at locations indicated, fastening securely to deck through curb flange.

3.3 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19..

END OF SECTION

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SECTION 07 84 00

FIRESTOPPING

PART 1 GENERAL

1.1 SYSTEM DESCRIPTION

- A. Provide UL Classified or Warnock Hersey Listed firestopping system to prevent the spread of fire, smoke and gasses through penetrations in fire resistive walls, floors and partitions, including; but not limited to; the following areas:
 - 1. Unprotected openings and openings accommodating penetrating items such as cables, cable trays, pipes, ducts, boxes and conduits through fire rated floors, walls and smoke barriers.
 - 2. Head of wall openings between wall and connecting floor or roof deck assemblies.
 - a. Meet requirements for exposure to hose stream test.
 - b. Applicable for use with steel fluted deck floor assemblies.
 - c. Allow deflection of floor or roof above.
- B. Firestop systems shall not be intended to support live loads and traffic unless specifically approved by Testing Agency.
- C. Firestop systems shall be approved by Code Authority.
- D. Firestop products shall remain flexible where subject to movement without affecting the integrity of the product.

1.2 SUBMITTALS

- A. Product Data: Submit Manufacturer's Specifications, performance criteria, Drawings and instructions.
- B. Shop Drawings: Submit Manufacturer's complete Shop Drawings showing proposed material, reinforcement, anchorage, fastenings method of installation and UL or Warnock Hersey listing number.
- C. Test Reports: Submit UL or Warnock Hersey test report description for firestopping system.
- D. Provide certificate of compliance from authority having jurisdiction indicating approval of firestop systems.
- E. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 QUALITY ASSURANCE

- A. Qualifications: Applicator with minimum of 2 years' experience with manufacturer's specified product.

- B. Regulatory Requirements: Conform to applicable code for fire resistance ratings and surface burning characteristics:
 - 1. ASTM E 136, ASTM E 119 and ASTM E 814, as applicable.
 - 2. UL 1479 fire test to achieve required fire-rating as noted on Drawings.
 - 3. Listing:
 - a. UL Fire Resistance Directory (current edition).
 - b. WH International Listings
- C. Pre-Installation Conference:
 - 1. Convene a pre-installation conference to review specifications and procedures with the Architect and Resident Engineer, Contractor, installer, manufacturer's representative, Owner and other trades relevant to the work, prior to ordering materials.
 - 2. Notify Architect and Resident Engineer at least 48 hours prior to starting Work.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Storage: Adequately protect against damage while stored at the site.
- C. Handling: Comply with Manufacturer's instructions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Furnish firestop systems acceptable to governing Code Authority from one of the following Manufacturers, subject to compliance with Specification requirements:
 - 1. U.S. Gypsum Co. www.usg.com
 - 2. Johns-Manville www.jm.com
 - 3. Tremco, Inc. www.tremcosealants.com
 - 4. RectorSeal Corporation www.recotrseal.com
 - 5. 3M Fire Protection Products www.3m.com
 - 6. Specified Technologies, Inc. www.stifirestop.com
 - 7. HILTI Firestop Systems www.hilti.com
 - 8. Nelson Firestop Products www.nelsonfirestop.com
 - 9. Grace Construction Products – Flamesafe www.grace.com
 - 10. Or equa.

2.2 MATERIALS

- A. Firestop System Materials - General:
 - 1. Appropriate for penetration.
 - 2. Include every component required for code approved installation, including; but not limited to:
 - a. Firestopping putties or compound.
 - b. Backing material.
 - c. Wrap strips.
 - d. Primers, clips and collars.
 - e. Forming and damming materials.
 - f. Sealant and solvent cleaner. At interior applications, provide sealant in accordance with the low-emitting materials requirements of Section 01 60 00– Product Requirements.

- B. Properties:
1. Free of asbestos, halogens and volatile components after curing and shall not slump or sag, (except for self-leveling products).
 2. Capable of maintaining an effective barrier against flames, heat and smoke in compliance with the requirements of ASTM E814, UL 1479 and U.B.C. Standard 7-5.
 3. Non-combustible per ASTM E 136.
 4. UV resistant where exposed to sunlight.
 5. Water resistant where exposed to moisture.
 6. Firestop system shall accommodate movement without adversely affecting fire rating of wall/floor assembly.
 7. Shrink resistant.
 8. Paintable or capable of receiving finish materials in those areas which are exposed to view and which are scheduled to receive finishes.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other Work which affects, connects with, or will be concealed by this Work.

3.2 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter which may affect bond of firestopping material.
- B. Remove incompatible materials which affect bond.
- C. Install backing materials to arrest liquid material leakage, if required.

3.3 INSTALLATION

- A. Installation shall conform to requirements of qualified designs or manufacturer approved modifications as supported by engineering reports, and shall be approved and accepted by the authority having jurisdiction.
1. Apply primer and firestop materials in accordance with Manufacturer's instructions and in accordance with the appropriate UL Fire Resistance Directory or with the appropriate Warnock Hersey International Listing.
 2. Apply firestopping material in sufficient thickness to achieve rating, to ensure against the passage of flames, smoke and toxic gases, and to a uniform density and texture.
 3. Protect materials from damage on surface subjected to traffic and install cover plates as required on firestop system that will or may be subject to traffic.
 4. Tool surfaces of firestop products to provide a smooth and clean appearance.

- B. Provide firestopping for conditions specified whether or not firestopping is indicated, and, if indicated, whether such material is designated as insulation, safing or otherwise. Insulation types specified in other sections shall not be installed in lieu of firestopping materials.
- C. Building Exterior Perimeters:
1. Where exterior facing construction is continuous past a structural floor, and a space (i.e. construction joint) would otherwise remain open between the inner face of the wall construction and the outer perimeter edge of the structural floor, provide firestopping to equal the fire resistance of the floor assembly.
 2. Mineral wool by itself shall not constitute an acceptable firestop. If mineral wool is part of firestop system, the mineral wool shall be completely covered by appropriate thickness of UL or Warnock Hersey listed firestop sealant.
 3. Firestopping shall be provided whether or not there are any clips, angles, plates, or other members bridging or interconnecting the facing and floor systems, and whether or not such items are continuous.
 4. Provide firestopping to continuously fill open spaces where an exterior wall of composite type construction passes a perimeter structural member, such as a girder, beam or strut, and the finish on the interior wall face does not continue up to close with the underside of the structural floor above, thus interrupting the fire-resistive integrity of the wall system, and creating a space that would otherwise remain open between the interior face of the wall and lower edge of the structural members.
- D. Interior Walls and Partitions:
1. Construction joints between top of fire rated walls and underside of floors above shall be firestopped.
 2. Firestop systems installed shall have been tested by either UL or Warnock Hersey, including exposure to hose stream test and including test for use with steel fluted deck floor assemblies.
 3. Firestop system used shall allow for deflection of floor or roof above.
- E. Penetrations:
1. Penetrations include conduit, cable, wire, pipe, duct or other elements which pass through one or both outer surfaces of a fire rated floor, wall, or partition.
 2. Provide firestopping to fill spaces in accordance with ASTM E 814 (UL 1479) where a penetration occurs through a structural floor or roof and a space would otherwise remain open between the surfaces of the penetration and the edge of the adjoining structural floor or roof, except at floors on grade.
 3. Requirements for penetrations shall apply whether or not sleeves have been provided. Firestop the annular space between sleeve and surrounding surfaces.

3.4 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

SECTION 07 92 00

JOINT SEALERS

PART 1 GENERAL

1.1 RELATED SECTIONS

- A. Related Sections:
1. Section 07 84 00: Sealants at fire penetrations
 2. Section 07 92 20: Acoustical sealants.
 3. Section 08 80 00: Sealant for butt glazing.

1.2 SUBMITTALS

- A. Product Data:
1. Submit manufacturer's current specifications and recommended installation procedures.
 2. Submit sample standard warranty to be signed jointly by applicator and manufacturer.
 3. Submit manufacturer's standard color chart.
- B. Shop Drawings: Illustrations in sufficient detail to show installation and interface of the work of this Section with the work of adjacent trades.
- C. Field Adhesion Test and Stain Reports: Submit copies of logs and test reports showing results of field adhesion testing and stain testing. In lieu of field adhesion test reports, contractor may provide manufacturer's certification that products are suitable for use indicated based on previous testing and successful use.
- D. Contract Closeout: Submit Manufacturer's Standard Warranty.
- E. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 QUALITY ASSURANCE

- A. Qualifications: Installers shall be thoroughly trained and experienced in the necessary skills and shall be thoroughly familiar with the specified requirements.
- B. Field Adhesion Testing: Perform preconstruction adhesion testing for each type of sealant and substrate as follows:
1. Notify Architect and Resident Engineer at least 7 days prior to date of adhesion testing.
 2. Arrange for manufacturer's field technical representative and Architect and Resident Engineer to be present during testing.
 3. Install sealant in test joints in minimum 60 inch lengths.
 4. Test joints by standard field adhesion hand pull test.
 5. For joints with dissimilar substrates, test adhesion to each substrate separately as recommended by sealant manufacturer.

6. Conduct number of field adhesion tests for each type of sealant and each type of substrate as follows:
 - a. Not less than 10 tests for the first 1,000 feet of installed sealant and 1 test for each additional 1,000 feet of sealant installed, or 1 test per floor per elevation.
 7. Document results of field adhesion tests and record results in field adhesion test log.
 8. Include in log data on pull distance used to test each joint sealant.
 9. Include data on joints where material connected with pull portion of sealant failed to adhere to joint substrate or tore cohesively.
 10. Inspect joints and record data for the following:
 - a. Complete fill.
 - b. No voids.
 - c. Joint dimensions matching those of manufacturer's recommended details.
 11. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
 12. Do not install joint sealants that fail to adhere to joint substrates during testing.
 13. Repair sealant test areas by removing damaged materials and applying sealant to test area using same procedure used to originally install the sealant.
- C. Stain Testing: Perform Stain testing of natural stone, masonry and other porous substrates proposed for use in the Work. Obtain actual samples of materials proposed for use and test to determine if permanent discoloration of porous surfaces will occur from direct contact with sealants. Perform stain testing in conformance with ASTM C1248 and as follows:
1. Notify Architect and Resident Engineer at commencement of stain testing procedure.
 2. Arrange for manufacturer's field technical representative and Architect and Resident Engineer to be present during examination of test results.
 3. Cut substrate to provide flat surface for application of sealant.
 4. Separate substrate materials by removable shims to create 1/2 x 1/2 x 3 inch joint.
 5. Fill joint with scheduled sealant, tool, and allow to cure for 21 days at room temperature.
 6. After 21 day curing, remove shims, compress joint to 50 percent of original joint width to 1/4 inch, and place in an oven at 158 degrees F. for 14 days.
 7. After 14 days in oven, remove and allow sample to cool to room temperature.
 8. Examine sample to determine presence of discoloration or change in appearance in any way to exposed surfaces.
 9. After visual inspection, cut sample in half to determine presence of discoloration or change in appearance in any way into the sample itself at the adhesive bond line and presence of bleeding into the area around the adhesive bond line.
 10. Document results of stain tests and record results in stain test log.
 11. Do not install sealants that show evidence of staining substrates.
- D. Field Color and Workmanship Samples: Caulk a section of joint as directed, under job conditions, at least 7 days prior to start of work for review by Architect and Resident Engineer. When approved, sample shall be used as a standard of comparison for remainder of work.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in manufacturer's original unopened packaging with labels intact.

- B. Storage: Adequately protect against damage while stored at the site. Maintain product in accordance with manufacturer's recommendations with proper precautions to ensure fitness of material when installed.
- C. Handling: Comply with manufacturer's instructions.

1.5 PROJECT/SITE CONDITIONS

- A. Physical Requirements for Proper Installation or Application: Observe manufacturer's temperature service range. Do not apply sealant when weather conditions will inhibit bonding and curing.

1.6 WARRANTY

- A. Provide standard warranty, in writing and signed jointly by the installer and sealant manufacturer, to replace sealants which fail at no additional cost to the Owner because of loss of cohesion or adhesion, or do not cure, and which fail to achieve air-tight and water-tight seal as follows:
 - 1. Sealant Types "A" and "B": 5 years.
 - 2. Sealant Types "C1" and "C2": 20 years.
 - 3. Sealant Types "D," "E" and "F": 2 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Furnish products of one of the following manufacturers subject to compliance with specifications requirements:
 - 1. Pecora www.pecora.com
 - 2. Tremco Vulkem Paraseal www.tremcosealants.com
 - 3. Dow Corning Corp. www.dowcorning.com
 - 4. General Electric www.ge.com
 - 5. Sika Corp. www.sika.com
 - 6. Sonneborn / Chemrex www.chemrex.com
 - 7. Or equal.
- B. Single Source Responsibility for Joint Sealer Materials:
 - 1. Obtain joint sealer materials from a single manufacturer for each different product required.
 - 2. If sealants from separate manufacturers must be used and could come in contact with each other, provide written certification from every manufacturer involved that the sealants are compatible and will adhere to each other.

2.2 MATERIALS

- A. General:
 - 1. Sealants, primers, back-up materials, bond breakers and related materials shall be compatible with adjoining materials.
 - 2. Sealants shall be in accordance with the low-emitting materials requirements of Section 01 60 00 - Materials and Equipment.

- B. Sealant:
1. The selection of proper sealant for a particular joint shall be in accordance with current published recommendations of the manufacturer.
 2. Types: See Schedule in Part 3 for the location where each type of sealant is to be provided.
 - a. Type "A": 2-part or 3-part (self-leveling) urethane, conforming to ASTM C920, Type M, Grade P, Class 25, Use T; Pecora NR-200 Urexpand Sealant or Dynatred, Tremco THC-900/901, Vulkem 45/245, Sikaflex 2c SL (self-leveling) Dow Corning Parking Structure Sealant (FC, NS or SL as applicable) and Sonneborn SL-2 or equal.
 - b. Type "B": 3-part chemically curing polyurethane sealant conforming to ASTM C920, Type M, Grade NS, Class 25, Use NT, M, A, O, and capable of withstanding movement of 50% in extension and compression, and sustained temperatures of 250 degrees F in service. Tremco Dymeric 240 FC Sealant, Pecora Dynatrol II, Vulkem 922, Sikaflex 2c NS (non-sag) and Sonneborn NP-2 or equal.
 - c. Type "C-1": One-part low modulus moisture cure silicone rubber sealant conforming to FS TT-S-001543A, Class A, FS TT-S-00230C, Type II, Class A and ASTM C 920, Type S, Grade NS, Class 25, Use NT, M, G,A, and O, and capable of withstanding movement of 100% in extension and 50% in compression in service. Dow Corning 790 Silicone Glazing Sealant, Tremco Spectrem 1 and Pecora 890 or equal.
 - d. Type "C-2": One-part medium modulus neutral cure silicone rubber sealant conforming to FS TT-S-001543A, Class A, FS TT-S-00230C, Type II, Class A and ASTM C 920, Type S, Grade NS, Class 25, Use NT, M, G,A, and O, and capable of withstanding movement of 50% in extension and 50% in compression in service. Tremco Spectrem 2, Pecora 895, Dow Corning 795, Dow Corning 791, and GE Silpruf or equal.
 - e. Type "D": ASTM C920, Type S, Grade NS, Class 25, Use NT, M,A,O. Sika Sikaflex 1A, Pecora Dynatrol 1, Tremco DyMonic FC, Pecora 345 and Sonneborn NP-1 or equal.
 - f. Type "E": Silicone rubber sealant with mold inhibitor. General Electric Sanitary 1700, Tremco Tremsil 200, Dow Corning 999, Pecora 898, Sonneborn Omni-Plus or equal.
 3. Sealants at fire penetrations: As specified in Section 07 84 00
 4. Color: Provide standard or custom colors as selected by Architect and Resident Engineer. In general, colors shall match adjacent materials.
- D. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- E. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- F. Joint Filler (Backer): ASTM D1565; round closed cell polyethylene, urethane or neoprene foam rod; oversized 30 to 50 percent; "SofRod" as manufactured by A.E.T. or equal.
- G. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.
- H. Gloss Reducer: Silica sand No. 20, color to match adjacent surface. Gloss reducer shall be provided at traffic sealant applications.

- I. Other Materials: Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor and approved by the sealant manufacturer as compatible, subject to the review of the Architect and Resident Engineer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces. Verify, before proceeding with this Work, that required inspections of existing conditions have been completed.
- B. Coordination: Coordinate with other work which affects, connects with, or will be concealed by this Work.

3.2 PREPARATION

- A. Clean, prepare, and prime joints in accordance with manufacturer's instructions. Remove loose materials and other foreign matter which may impair adhesion of sealant.
- B. Verify that joint shaping materials and release tapes are compatible with sealant.
- C. Examine joint dimensions and size materials to achieve required width/depth ratios.
- D. Use joint filler to achieve required joint depths, to allow sealants to perform properly.
- E. Use bond breaker where required.
- F. Protect adjacent surfaces from damage by masking when necessary.

3.3 INSTALLATION

- A. General:
 1. Install sealant in accordance with manufacturer's instructions.
 2. In general, seal openings and other locations which normally require sealant to seal against infiltration from air, water and most insects, including; but not limited to:
 - a. Construction and expansion joints.
 - b. Joints between dissimilar materials.
 - c. Joints around windows, door frames, louvers and other penetrations and openings in the exterior wall.
 - d. Interior wall openings.
 - e. Other locations indicated on drawings.
 3. Apply sealant within recommended temperature ranges. Consult manufacturer when sealant cannot be applied within recommended temperature ranges.
- B. Joints:
 1. Free of air pockets, foreign embedded matter, ridges, and sags.
 2. Tool joints concave.
- C. Apply sealant under pressure with hand or power actuated gun or other appropriate means. Gun shall have nozzle of proper size and provide sufficient pressure to completely fill joints as detailed.

- D. Neatly point or tool joint surfaces to provide slightly concave surfaces, free of wrinkles and skips, uniformly smooth and with perfect adhesion along both sides of joint.

3.4 CLEANING

- A. Clean adjacent surfaces of sealant as work progresses.
- B. Use solvent or cleaning agent as recommended by sealant manufacturer.
- C. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises.
- D. Construction Waste: In accordance with Section 01 74 19

3.5 SCHEDULE

- A. Expansion and Control Joints:
 - 1. Horizontal traffic: Type "A". Provide gloss reducer.
 - 2. Masonry, concrete to concrete, stucco, steel and wood:
 - a. Exterior: Type "C-1" or "C-2" as recommended by manufacturer.
 - b. Interior: Type "B".
 - 3. Glass (except insulating glass or special coated glass), aluminum, E.I.F.S., Natural Stone, and plastics: Type "C-1".
 - 4. Glass (including insulating glass or special coated glass), aluminum and plastics: Type "C-2".
- B. Non-expanding Joints:
 - 1. Glass (except insulating glass or special coated glass), aluminum, E.I.F.S., Natural Stone, and plastics: Type "C-1".
 - 2. Glass (including insulating glass or special coated glass), aluminum and plastics: Type "C-2".
 - 3. Concrete to concrete, stucco, masonry, aluminum, steel, and wood:
 - a. Exterior: Type "C-1 or "C-2" as recommended by manufacturer:
 - b. Interior: Type "D".
- C. Mechanical (ductwork and air conditioning):
 - 1. Exterior: Type "C-1 or "C-2" as recommended by manufacturer:
 - 2. Interior: Type "D".
- D. Plumbing Fixtures (around toilet, bath, kitchen fixtures, and food service equipment): Type "E".
- E. Acoustical (acoustical applications where sealant is required): In accordance with Section 07 92 20.

END OF SECTION

SECTION 07 92 20

ACOUSTICAL SEALANT

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Acoustical sealants to be installed in wall j-boxes penetrations, sill plates, walls meet structural ceiling, piping penetrations to guard against unwanted noise transfer.
- B. Related Sections:
 - 1. Section 07 92 00 – Joint Sealers.
 - 2. Section 09 29 00 – Gypsum Board: Installation of acoustical sealant simultaneously to installation of gypsum wallboard.

1.2 SUBMITTAL

- A. Samples: Acoustical sealant materials to be utilized shall be submitted to the Architect and Resident Engineer for approval.
- B. Product Data: Catalog cuts shall be submitted to the Architect and Resident Engineer for approval.
- C. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

PART 2 PRODUCTS

2.1 MATERIAL DESCRIPTION

- A. General:
 - 1. Where indicated on the drawings and/or described in the specifications, acoustical sealant shall be provided to prevent the transmission of airborne sound through cracks in the construction.
 - 2. Provide materials that comply with requirements of Indoor Environmental Quality and Material Emissions specified in Section 01 60 00.
- B. The acoustical sealant compound shall be of the non-hardening polysulphide type, or elastic water-base type. The sealant shall be one of the following:
 - 1. Pecora Corp. AC-20 FTR Acoustical and Insulation Sealant
 - 2. Tremco Acoustical Sealant
 - 3. United States Gypsum Sheetrock Acoustical Sealant
 - 4. Or equal.
- C. Backer Rod shall be polyethylene type "Sof Rod" as manufactured by Applied Technologies, Inc. or equal. It shall be closed cell, polymeric type with a density of 2.5 PCF and a tensile strength of 35 PSI.

- D. Removable expanding Silicone Foam shall be Dow Corning 3-6548 Silicone RTV Foam or equal.
- E. Pillow Pads shall be Metacaulk Firestop Pillows as manufactured by Rectorseal or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Apply sealants per manufacturer's written instructions.
- B. Clean surfaces as required for proper adhesion of sealants.
- C. Seals shall provide an "air tight" closure to the surface or material being sealed similar to that required for fire rated construction.
- D. Seal gypsum board to floor, ceiling, metal deck, concrete, etc.
- E. Apply 1/4-inch minimum rounded bead around penetrations and openings in gypsum board including outlet boxes, cable penetrations, pipes, HVAC ducts, structural members, etc. so that the wall, partition or ceiling becomes an "air tight" enclosure to the adjacent space.
- F. Provide continuous backer rod behind sealant at joints 3/8-inch or larger.
- G. Sealant shall be a minimum of 1/4-inch deep in joint.
- H. All gaps larger than 1/2-inch shall first be covered with gypsum board, lapped a minimum of 2-inches and screwed before using acoustical sealant.
- I. Provide fire rated acoustical sealant where required in fire rated assemblies.
- J. At penetrations requiring access, such as cable trays or open conduit for signal wires, fill openings at point of penetration with a removable expanding silicone foam or pillow pads.

END OF SECTION

SECTION 08 11 13

STEEL DOORS AND FRAMES

PART 1 GENERAL

1.1 SUBMITTALS

- A. Shop Drawings: Submit Drawings showing elevations of each door and frame type, typical and details of construction, location and installation requirements for hardware, size and thickness of material.
- B. Fire Rated Doors and Frames:
 - 1. Installation Instructions: Door and frame manufacturer shall clearly identify the hardware products, other materials and work requirements necessary to maintain compliance with UL 10(c) (positive pressure testing) as required by IBC Section 714.
 - 2. Certification: Submit certification that fire rated doors (including frames and hardware as a unit) will comply with UL 10(c) (positive pressure testing) as required by IBC Section 714.
- C. Furnish recognized independent test lab certification that products comply with ANSI A250.4,
- D. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.2 DELIVERY AND STORAGE

- A. Deliver welded frames with spreaders and doors with wrappers.
- B. Store doors and frames under protective cover in dry, enclosed spaces at the site. Place doors and frames on non-staining blocking. Raise bottoms of doors at least 4 inches high and provide 1/4 inch air space between stacked doors to avoid metal to metal contact and permit air circulation.

1.3 QUALITY ASSURANCE

- A. Doors and frames shall be certified to comply with ANSI A250.4, Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcing, and ANSI A250.8, Recommended Specifications for Standard Steel Doors and Frames.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Furnish steel doors and frames from one of the following Manufacturers subject to compliance with Specification requirements:
1. Steelcraft Manufacturing Co.
 2. Curries Company www.curries.com
 3. The Ceco Corporation www.cecodoor.com
 4. The Kewanee Corp. www.kewaneecorp.com
 5. Republic Builders Products www.republicdoor.com
 6. Fleming Steel Doors and Frames
 7. Or equal.
- B. Doors and frames shall be furnished by the same Manufacturer.

2.2 MATERIALS

- A. General
1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 2. Provide regional materials in accordance with Regional Materials provisions of Section 01 60 00.
- B. Doors: Furnish Level, Model and Physical Performance level in accordance with ANSI A250.8/SDI-100.
1. Level: Level 2, 18 gauge.
 2. Physical Performance: Level B.
 3. Model: Model 1, Full Flush.
- C. Core: Honeycomb, Polystyrene, Polyurethane or Vertical steel stiffener core as applicable. Core shall be as allowed by UL 10(c) for fire rated doors.
- D. Frames: ANSI A250.8/SDI 100, 16 gauge steel, fully welded. Exterior frames shall be thermally broken and insulated.
1. Thermal Breaks (Exterior Frames): Rigid polyvinylchloride (PVC) extrusion.
 2. Fiberglass Insulation (Exterior Frames): Loose batt type, density: 1.5 pcf (24kg/m³) (minimum), conforming to ASTM C665.
- E. Glazing Beads: Minimum 20 gauge steel.
- F. Steel: ASTM A1008 cold-rolled or ASTM A1011 hot-rolled. Hot-dip galvanized meeting ASTM A653, Grade G60 for exterior openings.
- G. Paint:
1. Non-lifting, rust-inhibitive grey primer meeting ANSI A224.1, compatible with field finish specified in Section 09 91 00, applied after bonderizing.
 2. See also Section 09 91 00 for requirements regarding paints for compliance with LEED™ requirements.
 3. Finish paint color to be coordinated with adjacent finishes as directed by Architect and Resident Engineer.

2.3 FABRICATION- DOORS

- A. Construct hollow metal doors, flush and vision lite types as scheduled on Drawings, in accordance with ANSI A250.8/SDI-100 with core as specified above. Reinforce top and bottom of doors horizontally by 16 gauge steel channels, full width, spot welded to each face at least 3 inches on center. Bevel edge of lock stile.
- B. Door Edge Joint and Treatment: Joints at the edges of doors shall have manufacturer's standard edge construction with seam edge filled, dressed smooth.
- C. Where heavy duty hinges have been specified, provide 7 gauge or equivalent reinforcing at hinge cut outs. Coordinate with hardware schedule.
- D. Exterior Doors: Close top and bottom edges of all exterior doors flush as an integral part of the door construction, or by placing end closure channel with web of channel flush with top and bottom edge of door (not inverted), or by addition of end cap at top and bottom of door, spot welded to each face at least 3 inches on center, filled and dressed smooth.
- E. Reinforce openings in doors for lites and vents on all sides with 14 gauge steel channel.
- F. Provide non-egress double doors with one-piece astragals of 14 gauge steel unless otherwise indicated or scheduled. Provide solid drip cap at top of exterior out-swinging doors.
- G. Accurately mortise doors for locks and hinges. Provide adequate box type reinforcement with steel plates welded to the interior reinforcing channels and drilled and tapped. Provide reinforcement for all other items of hardware.
- H. Doors with glass lite openings shall have trim recessed from the face of the door, beveled and attached with screws.
- I. Fire-Rated Doors: Provide fire rated doors investigated and tested as fire door doors, complete with type of hardware to be used. Identify each fire door with recognized testing laboratory labels, indicating applicable fire rating of steel doors. Doors required to meet smoke and draft control assembly requirements shall have labels that identify that the door has been tested and approved for smoke and draft control assemblies (S-label). Construct doors to comply with NFPA Standard No. 80 and UL-10(c).

2.4 FABRICATION - FRAMES

- A. Construct to shapes and sizes specified or shown, meeting various wall thicknesses in accordance with ANSI/SDI-100.
- B. Weld, fill, grind and dress smooth face frame miters.
- C. Mortise, reinforce, drill and tap for standard weight, full mortise template hinges and template strike.
- D. Provide not less than three 18 gauge anchors per jamb, or as shown on Drawings, spaced for maximum stiffness. Provide adjustable 18 gauge floor clips at each jamb, welded to back face of jamb, punched for securing to floor with two spaced anchors.

- E. Make cutouts for required hardware specified under Section 08 71 00, from templates furnished. Reinforce butt cutouts with minimum 8 gauge thick steel plate drilled and tapped and welded in place. When heavy duty hinges are specified, provide high frequency reinforcing at frames for hinges. Coordinate with hardware vendor. Provide strike stops of frames with holes for three rubber door silencers; on double door frames, provide for two silencers per door at head.
- F. For openings over 42 inches wide and at double openings, reinforce head members full length with a matching profile of 12 gauge steel. Provide anchor at midpoint of door, if practical.
- G. Construct frames for UL labeled doors in accordance with UL requirements and label as scheduled. Frames required to meet smoke and draft control assembly requirements shall have labels that identify that the frame has been tested and approved for smoke and draft control assemblies (S-label).
- H. Exterior frames shall be thermally broken
 - 1. Thermally broken sections shall not be assembled by means of screws, grommets or other fasteners.
 - 2. Where thermally broken set-up and welded frame product is specified, welds shall not cause thermal transfers between interior and exterior surfaces of the frame sections.
 - 3. Closed sections (mullions and center rails) of thermally broken frame product shall be factory insulated with 1.5 pcf (24kg/m³) loose batt type fiberglass material.
 - 4. Insulation of open sections (jambes, heads and sills) shall be provided and installed by the contractor responsible for installation.

2.5 FABRICATION - GLAZING FRAMES

- A. Construct in accordance with applicable parts of door frame Specification and as detailed. Extend partition frames around all four sides of openings.
- B. Provide glazing stops, removable one side and integral from the other side, secured with countersunk flat head Phillips screws spaced at not more than 16 inches on center and 2 inches from corners. Miter stops at corners.

2.6 FABRICATION TOLERANCES

- A. Allowable Tolerances for Fabrication: As specified in ANSI/SDI-117, Manufacturing Tolerances Standard Steel Doors and Frames.

2.7 PAINTING

- A. Bonderize and prime doors and frames with one shop coat of rust inhibitive primer.
- B. Finish painting in accordance with Section 09 91 00.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install metal door frames plumb, level, rigid and in true alignment as recommended in SDI 105 and ANSI/DHI A115.IG.

- B. Install doors and fasten to maintain alignment with frames to achieve maximum operational effectiveness and appearance.
 - 1. Maintain clearances as specified in ANSI A250.8, 2.1.8.
 - 2. Shim as required per NFPA 80, ANSI/A115.1G and SDI 122.
- C. Fill backs of frames solid with mortar at concrete and masonry construction, unless otherwise directed. Anchors for exterior frames shall be designed so as not to permit thermal transfers from exterior to interior surfaces of the frame sections.
- D. Install fire doors and frames to comply with NFPA 80 and in accordance with manufacturer's printed instructions.
- E. Prepare and install doors in accordance with ANSI A115 and SDI 122.

3.2 FIELD QUALITY CONTROL

- A. Manufacturer's representative shall inspect fire rated doors (including frames and hardware as a unit) and verify compliance with UL 10C (positive pressure testing) as required by IBC Section 714. Fire rated doors (including frames and hardware as a unit) which do not comply with UL 10C (positive pressure testing) as required by IBC Section 714 shall be removed and replaced at no additional cost to Owner.

3.3 CLEANING

- A. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of away from premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

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SECTION 08 14 00

WOOD DOORS

PART 1 GENERAL

1.1 SUBMITTALS

- A. Shop Drawings: Submit Drawings showing schedule of door sizes and types, door details and elevations. Note discrepancies between the Drawings and door schedules, and the requirements of regulatory and testing agencies.
- B. Product Data: Submit Manufacturer's data showing door construction.
- C. Samples: Before fabrication, submit sample of each type of door to be furnished, showing face, edge, core construction and factory finish for each type specified.
- D. Fire Rated Doors:
 - 1. Installation Instructions: Door manufacturer shall clearly identify the frame, hardware products, other materials and work requirements necessary to maintain compliance with UL 10(c) (positive pressure testing) as required by IBC Section 714.
 - 2. Certification: Submit certification that fire rated doors (including doors, frames and hardware as a unit) will comply with UL 10(c) (positive pressure testing) as required by IBC Section 714.
- E. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.2 QUALITY ASSURANCE

- A. Coordination: Contractor shall be responsible for coordinating and obtaining necessary information from Hardware and Metal Frame Manufacturers. Door Manufacturer shall be responsible for coordinating necessary information received by Contractor from Hardware and Metal Frame Manufacturers in order that doors shall be properly prepared to receive hinges and hardware. Contractor shall provide door supplier with approved frame schedule, hardware schedule, and hardware templates. Furnish to door supplier 60 days prior to desired delivery date of doors.
- B. Regulatory Requirements: Fire doors shall be listed and labeled by a nationally recognized testing and certification agency, in accordance with applicable building codes. Doors required to meet smoke and draft control assembly requirements shall have labels that identify that the door has been tested and approved for smoke and draft control assemblies (S-label). The listed doors shall meet or exceed ASTM E2074, UL-10(c) (positive pressure testing), Category A and NFPA 252 (September 1999) with all requirements as part of door construction (no additional edge sealing required). Provide fire labels from Warnock-Hersey International (WHI), or Underwriters Laboratories (UL).
- C. Certification: Provide each fire rated and sound rated door with a label permanently attached at eye level, to the hinge stile or, where interfering hardware such as full length hinges are applied, in a location acceptable to the local Code Authority, indicating the testing agency's approval for the rating required. Do not cover or conceal label.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Prior to delivery, provide protection compatible with finish specified for door edges and faces.
- B. Delivery:
 - 1. Deliver doors to the jobsite only when proper storage site is available.
 - 2. Store doors in an area having controlled temperature and humidity as recommended by NWWDA, AWI or WI and the door manufacturer.
 - 3. Store doors flat on factory pallets, or three full 2 x 4's, one centered and the other two 12 inches from each end. Do not stack doors on end, or on their vertical edge.
 - 4. Protect wood doors from construction activity, dirt, and exposure to sunlight.
- C. Handling:
 - 1. Always handle doors with clean hands or gloves.
 - 2. Do not drag doors across one another.
 - 3. Maintain factory packaging or other means of protection on doors, until date of Substantial Completion.

1.4 WARRANTY

- A. Warranty: Furnish the following manufacturer's standard warranty to Owner:
 - 1. Warrant doors from the date of installation against defects in materials and workmanship. Periods of warranty after date of installation:
 - a. Interior solid core and mineral core: Life of installation.
 - b. Interior hollow core: 5 years.
 - 2. Replacement under warranty shall include removal of the defective door, hanging, installation of hardware, and finishing.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Doors shall be products of one of the following Manufacturers:
 - 1. Algoma www.algomahardwoods.com
 - 2. Buell Door Company www.buelldoor.com
 - 3. Eggers Industries www.eggersindustries.com
 - 4. Marshfield Door Systems www.marshfielddoors.com
 - 5. Lambton www.lambtondoors.com
 - 6. Oshkosh Architectural Door Company www.oshkoshdoor.com
 - 7. Graham www.grahamdoors.com
 - 8. Or equal.

2.2 MATERIALS - GENERAL

- A. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.

2.3 FLUSH DOORS

- A. Wood - General: Wood and agrifiber products must contain no added urea-formaldehyde resins in accordance with the requirements of "Low Emitting Materials" as specified in Section 01 60 00 - Materials and Equipment.

- B. Cores - Solid Core: Staved lumber core. No formaldehyde content allowed.
- C. Edge Bandings:
1. Stiles (Dimensions given are minimum sizes allowed after factory trimming to booksize or prefitting) - Particleboard Core: 1-1/2 inch double banded laminated hardwood stile, laminated strand lumber or structural composite lumber (no finger joints allowed) in inner and outer band to be at least 1/2 inch wide same species lumber as face veneer with the exception of birch doors which will have hard maple stiles.
 2. Rails (Dimensions given are minimum sizes allowed after factory trimming to booksize or prefitting) - Particleboard Core: 1-1/4 inch minimum mill option hardwood rail. For doors scheduled to receive closers, provide minimum 5 inch solid wood top rail.
- D. Face Veneers, Crossbands and Backers: Doors shall be securely bonded together utilizing type 1 (fully waterproof) adhesive (compliant with the low-emitting materials requirements of Section 01 60 00 – Product Requirements) and the hot press assembly technique. All plies must be placed at right angles to adjacent plies. Doors manufactured by cold-pressing 2 or 3-ply pre-manufactured door skins to multiple cores in the same press shall not be acceptable.
1. Plastic laminate faced doors shall be a minimum 3-ply construction for particle core doors and minimum 5-ply construction for mineral core doors.
 - a. Laminate shall be NEMA LD-3, .050 inch, General Purpose Type, selected from Manufacturer's available sources. Color to be Carmel Sagawood textured" WM-8-350T by Nevamar as scheduled on Drawings.
 - b. Stile edges and outer wood trim shall be mill option hardwood stained or painted to match or mill option hardwood faced with matching plastic laminate.
 - c. Particle board (wood and agrifiber products) must contain no added urea-formaldehyde resins in accordance with the requirements of "Low Emitting Materials" as specified in Section 01 60 00 – Product Requirements.
 2. Paint Grade:
 - a. Furnish Medium Density Overlay for paint grade doors. MDO shall meet PS1-74.
 - b. Overlay shall be factory primed, readily sandable, weatherproof, and carry a Class "B" Fire Rating.
 - c. Paint grade Birch hardwood and hardwood surfaced doors shall not be considered as meeting this Specification.
 - d. Paint finish to be as scheduled on Drawings and shall be applied in accordance with Section 09 91 00 requirements.
- E. Glue:
1. Type 1 per NWWDA/WDMA T.M.-6 for interior and exterior doors.
 2. In accordance with the low-emitting materials requirements of Section 01 60 00 – Product Requirements.

2.4 LABELED FLUSH DOORS

- A. Mineral core flush veneered doors, 5-ply, shall be made up of face veneers, crossbanding, and a core unit securely bonded together utilizing Type I (fully waterproof) adhesive (compliant with the low-emitting materials requirements of Section 01 60 00 – Product Requirements) and the hot press assembly technique. Provide matching transom panels where scheduled.

- B. Face Veneers and Crossbanding: Same as specified for non-labeled doors.
- C. Core Unit: Asbestos free, noncombustible mineral composite with a minimum of 28 pounds per cubic foot) density when tested in accordance with ASTM C303, with 10 percent maximum absorption by weight with core in equilibrium at 90 percent relative humidity and 70 degrees F.. Provide flame resistant blocking as required by the hardware schedule. The door listing shall not limit the size or location of such blocking.
 - 1. Provide one lock block 5 inches x 12 inches when a bored unit or mortise lock is to be used and two lock blocks when the door is equipped with an exit device.
 - 2. For doors with closers include 6 inch top rail. Provide wide bottom rails for exit, manual and automatic flush bolts and automatic door bottoms.
- D. Rails: Top 15/16 inch, bottom 1-7/8 inches rail (one or two piece) of flame resistant material - salt free. Securely glue rails to core. For doors scheduled to receive closers, provide minimum 5 inch solid wood top rail.
- E. Stiles: Manufacturer's standard for receiving a full mortise hinge. No salt treated components shall be used. UL or WH approved for labeled doors meeting the following performance criteria:
 - 1. Split Resistance: Average of ten test samples shall be not less than 900 load pounds when tested in accordance with "Test Method to Determine Split Resistance of Hinge Edges of Composite Type Fire Doors."
 - 2. Direct Screw Withdrawal: Average of ten test samples shall be not less than 650 load pounds when tested for direct screw withdrawal in accordance with ASTM D1037; using a No. 12 x 1-1/4 inch steel thread-to-the-head wood screw of the cadmium plated or rust-resistant type. Drill 5/32 inch pilot hole, approximately 1/8 inch beyond the length of the screw.
 - 3. Cycle/Slam: 200,000 cycles with no loose hinge screws or other visible signs of failure when tested in accordance with the requirements of ANSI A151.1, Section 2.5.
- F. Vision Frames: Provide one of the following.
 - 1. Furnish metal vision frames primed for field painting for doors with lites. Frames shall meet AWI standard, UL, or WHI approved.
 - 2. Furnish Marshfield Door Systems "Trim-lite" 20 minute wood molding system with flush or lipped bead moulding profile or equal as selected by Architect and Resident Engineer, or Algoma Veneer wrapped wood bead, fire-rated for 45, 60 and 90 minutes or equal.
- G. Manufacture labeled doors to the required size so as to provide proper clearances without field trimming. Machining of labeled doors must be completed before label is applied to assure the full thickness of the edge bands. Machine fire doors to meet NFPA 80 requirements. Provide channels for concealed exit devices specified in Section 08 71 00 and in conformance with UL requirements.
- H. Meeting edges on pairs of labeled doors:
 - 1. Treated stiles at pairs of 20 minute doors.
 - 2. No metal edge or astragal at pairs of 45, 60 or 90 minute door. Furnish "Pair Guard" door as manufactured by Marshfield Door Systems or equal with surface mounted vertical rods on each leaf.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine door frames to assure that jambs are true and plumb. Correct frames which are not true and plumb before doors are hung.

3.2 INSTALLATION

- A. Doors shall be hung true and plumb with standard bevel and with uniform 3/32 inch clearance at jambs and head, and 1/2 inch bottom clearance, unless otherwise required. Mortise, drill or otherwise prepare doors for finish hardware specified in Section 08 71 00, Finish Hardware. Pilot drill screw and bolt holes.
- B. Doors that are cut or planed for fitting shall be immediately resealed with a transparent wood sealer. Doors shall operate freely without sticking or binding, without hinge-bound conditions and with hardware installed, properly adjusted and functioning.
- C. Install fire doors and frames to comply with NFPA 80 and in accordance with manufacturer's printed instructions.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's representative shall inspect fire rated doors (including frames and hardware as a unit) and verify compliance with UL 10C (positive pressure testing) as required by IBC Section 714. Fire rated doors (including frames and hardware as a unit) which do not comply with UL 10C (positive pressure testing) as required by IBC Section 714 shall be removed and replaced at no additional cost to Owner.

3.4 CLEANING

- A. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of away from premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

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SECTION 08 31 13

ACCESS DOORS AND FRAMES

PART 1 GENERAL

1.1 SUBMITTALS

- A. Shop Drawings: Submit Drawings showing sizes, construction and installation details.
- B. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.2 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Storage and Protection: Deliver and store items in dry, protected areas. Adequately protect against damage while stored at the site.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Furnish products of one of the following Manufacturers, except as approved by the Architect and Resident Engineer, subject to compliance with Specification requirements:
 - 1. Babcock-Davis (Cierra Products) www.babcockdavis.com
 - 2. Nystrom Building Products www.nystrom.com
 - 3. Karp Associates www.karpinc.com
 - 4. J.L. Industries www.jlindustries.com
 - 5. Milcor Inc. www.milcorp.com
 - 6. Or equal.

2.2 ACCESS DOORS

- A. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
- B. Doors: Sizes as shown on the Drawings. Units shall be prime painted steel at painted wall construction and stainless steel in tile and other locations as indicated, in types as required by wall construction, as follows (based on Babcock-Davis):
 - 1. Non-Rated Access Panels:
 - a. Drywall Walls and Ceilings: Babcock-Davis B-NW access panel or equal.
 - b. Masonry, Tile Walls, Etc.: Babcock-Davis B-NT access panel or equal.
 - c. Acoustical Tile: Babcock-Davis B-RA access panel or equal.
 - 2. Fire-Rated Access Panels:
 - a. Drywall Walls and Ceilings: Babcock-Davis B-IW, Insulated, Fire-Rated access panel or equal.
 - b. Masonry, Tile Walls, Etc.: Babcock-Davis B-UT, Insulated, Fire-Rated access panel or equal.

- C. Door and Frame: 16 gage steel. Provide key operated cylinder lock with additional screw driver operated cam locks in sufficient quantity as recommended by manufacturer to hold door in flush closed position. 16 gage steel shall be used for door and frame. Type K door shall have concealed spring hinges to allow door to open a minimum of 175 degrees. Size as required or as indicated on the Drawings.
- D. Access Doors in Fire Rated Construction:
 - 1. Doors shall be UL or Warnock Hersey labeled and meet self-closing and self-latching requirements for fire rated ceiling assembly.
 - 2. Doors shall be UL 1-1/2 hour fire rated when located in a fire rated wall assembly.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install access doors in accordance with Manufacturer's directions at locations shown on Drawings or necessary for access to valves, dampers and other devices or equipment requiring periodic access. Do not install panels in locations where frame will extend over transition between two separate wall or ceiling finish materials (i.e. tile to gypsum board).
- B. Install plumb and level, true to line.

3.2 CLEANING

- A. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of away from premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

SECTION 08 36 13

SECTIONAL OVERHEAD DOORS

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes the following types of sectional overhead doors:
 - 1. Doors with aluminum-framed aluminum panels and light inserts.
 - 2. Tracks configured for Standard lift.

1.2 DEFINITIONS

- A. Operation Cycle: One complete cycle of a door begins with the door in the closed position. The door is then moved to the open position and back to the closed position.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide sectional overhead doors capable of withstanding the effects of gravity loads and the following loads and stresses without evidencing permanent deformation of door components:
 - 1. Wind Load: Uniform pressure (velocity pressure) of 201bf/sq. ft., acting inward and outward. Deflection of door in horizontal position to be maximum 1/120" of door width.
- B. Operation-Cycle Requirements: Design sectional overhead door components and operator to operate for not less than 100,000 cycles.

1.4 SUBMITTALS

- A. Product Data: For each type and size of sectional overhead door and accessory. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes. Provide roughing-in diagrams, operating instructions, and maintenance information. Include the following:
 - 1. Setting drawings, templates, and installation instructions for built-in or embedded anchor devices.
 - 2. Motors: Show nameplate data and ratings; characteristics; mounting arrangements; size and location of winding termination lugs, conduit entry, and grounding lug; and coatings.
- B. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's data sheets.
 - 1. Wiring Diagrams: Detail wiring for power, signal, and control systems. Differentiate between manufacturer-installed and field-installed wiring and between components provided by door manufacturer and those provided by others.
- C. Samples for Verification: Of each type of exposed finish required, prepared on Samples of size indicated below and of same thickness and material indicated for Work. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
 - 1. Frame: 6-inch length.
 - 2. Panel: 6 inches square.

- D. Manufacturers' Certificates: Signed by manufacturers certifying that materials supplied comply with requirements specified in "Quality Assurance" Article. On request, submit evidence of manufacturing experience.
- E. Installer's Qualifications: Provide information which verifies quality assurance requirements for the installer.
- F. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who is an authorized dealer of the sectional door manufacturer for both installation and maintenance of units required for this project. Installer shall have at least two years of experience with projects similar in nature and size to the subject projects
- B. Manufacturer Qualifications: Engage a firm experienced in manufacturing sectional overhead doors similar to those indicated for this Project and with a record of successful in-service performance.
- C. Source Limitations: Obtain sectional overhead doors through one source from a single manufacturer except that door operators may come from a manufacturer other than the door manufacturer.
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of sectional overhead doors and accessories and are based on the specific system indicated. Other manufacturers' systems with equal performance and dimensional characteristics may be considered.
- E. Listing and Labeling: Provide electrically operated fixtures specified in this Section that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Storage: Adequately protect against damage while stored at the site.
- C. Handling: Comply with Manufacturer's instructions.

1.4 PROJECT/SITE CONDITIONS

- A. Field Measurements: Verify existing conditions by taking field measurements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide doors by Raynor Garage Doors or equal.

2.2 MATERIALS AND ACCESSORIES – GENERAL

- A. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.

2.3 ALUMINUM SECTIONS

- A. General:
 - 1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 2. Color and Gloss: Armor Brite - powder coat from manufacturer's standard colors by Raynor or equal as selected by Architect and Resident Engineer.
- B. Sections shall be 2" (50.8mm) thick 6036-T6 aluminum alloy frame with .050 (1.3mm) thick aluminum panels. Stiles and rails to be joined together with 5/16" (7.9mm) galvanized throughbolts. Panels to be completely encased in soft vinyl channels and held in place with a snap-in extruded aluminum retainer. Bottom rail to be 5-1/8" (130.2mm), top rails 3-1/4" (82.5mm). The combined dimension of the two meeting intermediate rails shall be 3-3/4" (95.2mm). End stiles shall be 3-1/4" (82.5mm) or 6-1/4" (158.7mm) wide, depending on door size. Center stiles to be 3-5/8" (92.1 mm) wide.

2.4 TRACKS, SUPPORTS, AND ACCESSORIES

- A. Tracks: Provide manufacturer's standard normal headroom, galvanized steel track system, sized for door size and weight, designed for lift type indicated and clearances shown, and complying with ASTM A 653, for minimum G60 zinc coating. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing rollers for required door type and size. Slope tracks at proper angle from vertical or otherwise design to ensure tight closure at jambs when door unit is closed. Weld or bolt to track supports.
- B. Track Reinforcement and Supports: Provide galvanized steel track reinforcement and support members, complying with ASTM A 36 and ASTM A 123. Secure, reinforce, and support tracks as required by industry and Title 24 standards- (including seismic criteria), for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors. Provide all seismic bracing required by code.
- C. Support and attach tracks to opening jambs with continuous angle bolted to tracks and attached to wall. Support horizontal (ceiling) tracks with continuous angle welded to track and supported by laterally braced attachments to overhead structural members at curve and end of tracks.

- D. Track: Track shall be 2" deep for doors up to 20' wide and shall be 3" deep for doors over 20' wide: with hot-dipped galvanized finish. Vertical tracks to be continuous angle mounted and fully adjustable for sealing door to jamb. Continuous angle size to be not less than 2-5/16" x 4" x 3/32" on 2" track, or not less than 3-1/2" x 5" x 1/8" on 3" track. Horizontal track to be adequately reinforced with continuous angle.
- E. Weatherseals: Provide replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene.
 - 1. Provide motor-operated doors with combination bottom weather-seal and sensor edge.
 - 2. Provide continuous flexible seals at door jambs and head for weather-tight installation.
- F. Glazing: Sections may be furnished with factory-installed 24 inch x 8 inch lite inserts with rounded corners set into the aluminum panels and held in place with black rubberized gaskets utilizing the following glazing materials:
 - 1. Clear Polycarbonate Plastic: 3-mm clear, transparent, polycarbonate sheet manufactured by extrusion process.

2.5 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: Provide heavy-duty galvanized steel hinges, of not less than 0.0747-inch- thick uncoated steel, at each end stile and at each intermediate stile, per manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible. Provide double-end hinges, where required, for doors exceeding 16 feet in width.
- C. Rollers: Provide heavy-duty rollers, with minimum 10 steel ball bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide 3-inch- diameter roller tires for 3-inch track, 2-inch- diameter roller tires for 2-inch track, and as follows:
 - 1. Case-hardened steel tires.

2.6 COUNTERBALANCING MECHANISM

- A. Torsion Spring: Operation by torsion-spring counterbalance mechanism consisting of adjustable tension torsion springs, fabricated from oil-tempered-steel wire complying with ASTM A 229, Class II, mounted on a continuous solid steel shaft. Connect to door with galvanized aircraft-type lift cables with cable safety factor of at least 5 to 1. Provide springs calibrated for 100,000 cycles minimum,
- B. Cable Drums: Provide cast-aluminum or gray-iron casting cable drums grooved to receive cable. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of shaft. Provide 1 additional midpoint bracket for shafts up to 16 feet long and 2 additional brackets at one-third points to support shafts more than 16 feet long, unless closer spacing is recommended by door manufacturer.
- C. Bracket: Provide anchor support bracket, as required to connect stationary end of spring to the wall, to level shaft and prevent sag.

2.7 ELECTRIC DOOR OPERATORS

- A. General:
 - 1. Provide electric door operator assembly of size and capacity recommended by door manufacturer for door and operational life specified, complete with electric motor and factory-wired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for complete and proper operation.
 - 2. Apparatus doors shall have the ability to have a manual override enabling the door to be opened manually in less than 1.5 minutes.
- B. Comply with NFPA 70.
- C. Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.
- D. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24V, ac or dc.
- E. Door-Operator Type: Provide unit as manufactured by R&S Automation, consisting of electric motor and the following:
 - 1. Gear-head trolley type, with enclosed worm-gear running-in-oil primary drive, chain and sprocket secondary drive, and quick disconnect-release for manual operation. Disconnect to have 1/8" cable minimum.
 - 2. Mount disconnect and operator so they are accessible from floor level.
- F. Electric Motors: Provide high-starting torque, reversible, continuous-duty, Class A insulated, electric motors, complying with NEMA MG 1, with overload protection, sized to start, accelerate, and operate door in either direction, from any position, at not less than 2/3 fps and not more than 1 fps, without exceeding nameplate ratings or considering service factor.
 - 1. Type: Polyphase, medium-induction type.
 - 2. Service Factor: According to NEMA MG 1, unless otherwise indicated.
 - 3. Refer to drawings for wiring requirements and electrical characteristics of motors.
- G. Remote-Control Station: Provide momentary-contact, 3-button control station with push-button controls labeled "Open," "Close," and "Stop." The "Stop" button shall be disabled.
 - 1. Provide interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
 - 2. Door are to be able to be operated both at push buttons located by each door, a master control panel adjacent to the main apparatus floor doentry.
 - 3. Door operators shall be compatible with Linear Delta III controller receiver. The receiver antenna shall be located to receive a signal from the street.

- H. Obstruction Detection Device: Provide each motorized door with indicated external automatic safety sensor able to protect full width of door opening. Activation of sensor immediately stops and reverses downward door travel.
 - 1. Sensor Edge: Provide each motorized door with an automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor immediately stops and reverses downward door travel.
 - a. Provide the following components as manufactured by Miller Safety Edge and Linear Corporation operators/receivers/transmitters including universal wireless receiver/transmitter with alarm for low battery levels:
 - 1. "Miller Edge" ME-123 or approved equal, including universal 4-wire fail safe.
 - 2. DRG-2r Receiver.
 - b. Self-Monitoring Type: Provide self-monitoring, 4-wire configured device.
 - 2. Each door shall have a separate electric eye and electrical safety device to prevent contact with fire apparatus. Eyes shall be set 2.5 feet above floor to intersect the vehicle bumper.
- I. Limit Switches: Provide adjustable switches, interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
- J. Radio Control: Provide radio control system consisting of the following:
 - 1. Linear Corp, Model DR receiver (one each per door).
 - 2. Linear Corp, Model DT2A transmitter (two each per door).
- K. Safety Strobe: During operation each door shall have a safety strobe indicated while the door is opening to full height.
- L. Doors shall have a light-base signal system, alerting the driver when the door is fully open (green) and not fully open (red).

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine wall and overhead areas, including opening framing and blocking, with Installer present, for compliance with requirements for installation tolerances, clearances and other conditions affecting performance of Work of this Section.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install door, track, and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports according to Shop Drawings, manufacturer's written instructions, and as specified. Provide all blocking between ceiling joists as required for secure support of guide rails, etc. Contractor shall provide all adjustments, miscellaneous intermediate framing, supports blocking, etc. as required to accommodate existing conditions and necessary to provide complete and fully-functional and operational sectional door system at each location indicated.

- B. Fasten vertical track assembly to framing at not less than 24 inches o.c. Hang horizontal track from structural overhead framing with angle or channel hangers welded and bolt fastened in place. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipments. All new work shall be installed plumb and level.
- C. Doors shall be wired to the emergency electrical circuit to facilitate continuous operation. Cut-off switch shall be installed at each door within reach, for maintenance and repair purposes.

3.3 ADJUSTING AND CLEANING

- A. Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and fitting weather-tight for entire' perimeter.
- B. Construction Waste: In accordance with Section 01 74 19.

3.4 DEMONSTRATION

- A. Startup service; Engage a factory-authorized representative to perform startup services and to train Owner's maintenance personnel as specified below:
 1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 2. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventative maintenance.
 3. Review data in the maintenance manuals.
 4. Schedule training with Owner with at least 7 days' advance notice.

END OF SECTION

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SECTION 08 41 13

ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Aluminum doors and window wall frames.
- B. Related Sections:
 - 1. Section 08 51 13 - Aluminum Windows.
 - 2. Section 08 71 00 - Door Hardware
 - 3. Section 08 80 00 - Glazing.

1.2 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Window wall framing system shall provide for flush retained glazing on all sides without projecting stops with off-center glazing as detailed on Drawings.
 - 2. Framing system shall be suitable for outside or inside glazing.
 - 3. System shall be either screw spline, shear block or a compensating/stick system, as applicable.
- B. Test Procedures and Performance (Exterior window wall):
 - 1. Air Infiltration Test
 - a. Test unit in accordance with ASTM E 283 at a static air pressure difference of 6.24 psf (299 Pa).
 - b. Air infiltration shall not exceed .06 cfm/SF (.30 l/s·m²) of unit.
 - 2. Water Resistance Test
 - a. Test unit in accordance with ASTM E 331.
 - b. There shall be no uncontrolled water leakage at a static test pressure of 12.0 psf (718 Pa).
 - 3. Uniform Load Deflection Test
 - a. Test in accordance with ASTM E 330.
 - b. Deflection under design load shall not exceed L/175 of the clearspan.
 - 4. Uniform Load Structural Test
 - a. Test in accordance with ASTM E 330 at a pressure 1.5 times the design wind pressure in 1.05.B.3.b.
 - b. At conclusion of the test, there shall be no glass breakage, permanent damage to fasteners, storefront parts, or any other damage that would cause the storefront to be defective.
 - 5. Condensation Resistance Test (CRF)
 - a. Test unit in accordance with ASTM 1503.1.
 - b. Condensation Resistance Factor (CRF) shall not be less than 68 (frame) and 71 (glass) when glazed with 1" (25 mm) insulated – 1/4" (6 mm) clear low emissivity, 1/2" (12 mm) air, 1/4" (6 mm) clearglass.
 - 6. Thermal Transmittance Test (Conductive U-Value)
 - a. Test in accordance with ASTM 1503.1.
 - b. Conductive thermal transmittance (U-Value) shall not be more than 0.50 BTU/hr·ft²·°F (2.83 W/m²·K) when glazed with 1" (25 mm) insulated – 1/4" (6 mm) clear low emissivity, 1/2" (12 mm) air, 1/4" (6 mm) clear glass.

7. Thermal Transmittance Test (Conductive U-Value)
 - a. Test in accordance with NFRC-102.
 - b. Conductive thermal transmittance (U-Value) shall not be more than 0.46 BTU/hr·ft²·°F (2.61 W/m²·K) when glazed with 1" (25 mm) insulated – 1/4" (6 mm) clear low emissivity, 1/2" (12 mm) air, 1/4" (6 mm) clear glass.
- C. Performance - Aluminum Doors (Swinging): Resistance to corner racking shall be tested by the Dual Moment Load test as follows:
1. Test section shall consist of standard top door corner assembly. Side rail section shall be 24 inches (600mm) long and top rail section 12 inches long.
 2. Anchor "top rail" positively to test bench so that corner protrudes 3 inches beyond bench edge.
 3. Anchor a lever arm positively to side rail at a point 19 inches from inside edge of top rail. Attach weight support pad at a point 19 inches from inner edge of side rail.
 4. Test section shall withstand a minimum load of 200 pounds on the lever arm before reaching the point of failure, which shall be considered a rotation on the lever arm in excess of 45 degrees.

1.3 SUBMITTALS

- A. Submit product data, shop drawings and samples in accordance with Section 01 33 00.
1. Product Data: Submit 2 copies of Manufacturer's Specifications, recommendations and standard details for aluminum doors, frames and components of the Work. Include manufacturer's installation manual.
 2. Shop Drawings:
 - a. Include wall elevations at 1/2 inch scale, and full-size detailed sections of every typical composite member.
 - b. Show anchors, joint system, expansion provisions, end dams, water diverters and other components not included in Manufacturer's standard data.
 - c. Include glazing details.
 3. Samples:
 - a. Submit 3 samples of each required aluminum finish on 12 inch long extrusions or 6 inch square sheets of the alloys to be used for the Work.
 - b. Where normal color and texture variations are to be expected, include 2 or more units in each Sample, to show the range of such variations.
 - c. Samples will be reviewed by Architect and Resident Engineer for color and texture only.
 - d. Architect and Resident Engineer reserves the right to require samples of typical fabricated sections, showing joints, exposed fastenings (if any), quality of workmanship, hardware and accessory items, before fabrication of the Work proceeds.
- B. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.4 QUALITY ASSURANCE

- A. Standards: Except as otherwise indicated, the requirements for aluminum doors and frames, and the terminology used in this Section, are those of NAAMM, AAMA and AA and in particular, those of the "Entrance Manual" by NAAMM.
- B. Regulatory Requirements:
 - 1. ANSI A117.1, 1998 "Accessible and Usable Buildings and Facilities."
 - 2. Public Law 101-336 "The Americans with Disabilities Act of 1990 (ADA).
 - 3. ADA Accessibility Guidelines (ADAAG).
- C. Single Source Responsibility: Obtain entrances, window wall and operable windows, including finishes, used for this project through one source from a single manufacturer.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Storage: Adequately protect against damage while stored at the site.
- C. Handling: Comply with Manufacturer's instructions.

1.6 PROJECT/SITE CONDITIONS

- A. Field Measurements:
 - 1. Whenever possible, check the actual openings in the construction Work by accurate field measurement before fabrication, and show recorded measurements on final shop drawings.
 - 2. Coordinate fabrication schedule with construction progress as directed and avoid delays of the Work.
 - 3. Where necessary, proceed with fabrication without field measurement, and coordinate installation tolerances to ensure proper fit of units.

1.7 WARRANTY

- A. Warrant entire system of aluminum entrance doors and frames against leaks or other defects for a period of ten (10) years in accordance with manufacturer's standard warranty as follows:
 - 1. Defective materials and workmanship are hereby defined to include, but are not limited to, evidence of:
 - a. Penetration of water into the building through fixed glazing and framing components.
 - b. Air infiltration exceeding specified limits.
 - c. Structural failure of components resulting from forces within specified limits.
 - d. Failure of insulated glass units.
 - e. Cracking, crazing, flaking, of coatings or opacifiers on glass.
 - f. Secondary glass damage and/or damage due to falling components.
 - g. Adhesive or cohesive failure of sealant.
 - h. Crazing on surface of non-structural sealant.
 - i. Non-structural sealant hardening beyond Shore A durometer 50 or softening below 20.
 - j. Failure of operating parts to function normally.

- B. Warrant aluminum finish against excessive fading, excessive non- uniformity of color or shade, cracking, peeling, pitting or corroding (all within the limits defined). Warranty shall include replacement at no charge (material and labor) for a period of five (5) years beginning on the date of final acceptance.
- C. Upon notification of defects within the warranty period, make the necessary repairs and replacements at the convenience of the Owner. Repairs and replacements shall include resultant damage to adjacent materials, systems and equipment.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Furnish products of one of the following manufacturers subject to compliance with specifications requirements:
 - 1. EFCO www.efcocorp.com (Basis of Design)
 - 2. Arcadia, Inc. www.arcadiainc.com
 - 3. Kawneer Co. www.kawneer.com
 - 4. United States Aluminum Corp. www.usalum.com
 - 5. Vistawall Architectural Products. www.vistawall.com
 - 6. Or equal.

2.2 MATERIALS

- A. General
 - 1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 - 2. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
- B. Framing members, transition members, mullions, adapters, and mountings: Extruded 6063 T6 aluminum alloy and temper.
- C. Screws, miscellaneous fastening devices, and internal components: Aluminum, stainless steel, or zinc plated steel in accordance with ASTM B633. Perimeter (exposed) anchors shall be aluminum or steel, providing the steel is properly isolated from the aluminum.
- D. Dissimilar Metals: Properly insulated to prevent galvanic action.
- E. Thermal Barrier: Barrier material shall be poured in place, two-part polyurethane. A nonstructural thermal barrier is unacceptable.
- F. Glazing gaskets: Elastomeric extrusions as required to provide specified performance. PVC glazing gaskets are not acceptable.
- F. Steel Sections: ANSI/ASTM A36; shaped to suit mullion sections.
- H. Shop and Touch-Up Primer for Steel Components: SSPC 15, Type 1, redoxide.
- I. Touch-Up Primer for Galvanized Steel Surfaces: SSPS 20, zinc rich type.
- J. Glass: As specified in Section 08 80 00.

- K. Sealant:
1. Silicone sealant in accordance with Section 07 92 00.
 2. Interior Applications: In accordance with the low-emitting materials requirements of Section 01 60 00 – Product Requirements.

2.3 COMPONENTS

- A. Sizes and Profiles: The required sizes for doors and frame units, and profile requirements, are shown.
1. Exterior windowwall: Series 406 as manufactured by EFCO or equal, 2 inches by 6-1/2 inch thermal storefront framing. Framework shall accept translucent wall systems specified in Section 08 45 43 and aluminum windows (operable) specified in Section 08 51 13.

2.4 FABRICATION

- A. General:
1. Weld by methods recommended by the Manufacturer and AWS to avoid discoloration at welds.
 2. Grind exposed welds smooth and restore mechanical finish.
 3. Remove arises from cut edges and ease edges and corners to a radius of approximately 1/64 inch.
 4. Conceal fasteners, wherever possible, except as otherwise shown.
 5. Maintain continuity of line and accurate relation of planes and angles.
 6. Provide secure attachment and support at mechanical joints, with hairline fit of contacting members.
 7. Reinforce the Work as necessary for performance requirements, and for support to the structure.
 8. Separate dissimilar metals with bituminous paint or preformed separators which will prevent corrosion.
 9. Separate metal surfaces at moving joints with non-metallic separators to prevent "freeze-up" of joints.
- B. Frames:
1. Fabricate tubular assemblies as shown, with either welded or mechanical joints in accordance with Manufacturer's standards, with concealed fasteners wherever possible.
 - a. Extrusions: Minimum wall thickness of 0.080 inches.
 - b. Exposed work: Carefully matched to produce continuity of line and design with all joints. System design shall be such that raw edges shall not be visible at joints.
 - c. Components:
 - 1) Frames (Typical): Screw spline construction.
 - 2) Door Frames: Shear blocked horizontals between the door jambs with screw spline sidelites.
 - d. Glazing: Dry glazed with recyclable EPDM gasket on both exterior and interiors.
 2. Provide members of the size, shape, and profile shown.
 3. Reinforce internally with steel channel shapes as shown, or as necessary to support the required loads. Secure vertical steel at head and sill as necessary for structural performance.
 4. Weatherstripping: Provide compression weatherstripping on door-contact face of door stops on exterior door frames and/or other frames where indicated.

5. Glass framing members shall provide for flush glazing with through sight lines, without projecting stops for glass thicknesses noted on drawings or as specified in Section 08 80 00.
6. Provide glazing system for frames to receive lights. Design system for replacement of glass.
7. System shall provide resilient settings for glass by use of elastomeric extrusions as required to provide specified performance. PVC glazing gaskets are not acceptable.
8. Fabricate frame assemblies for exterior walls with flashing and weeps to drain penetrating moisture to exterior.
9. Provide anchorage and alignment brackets for concealed support of assembly from the building structure.
10. Exterior window wall framing systems shall be designed to provide for thermal movement of all component materials resulting from surface temperatures as applicable to location of project (180 degree F range) without causing buckling, stresses on glass, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance, or other detrimental effects. Operating windows and doors shall function normally over this temperature range.
11. Include flashings in conjunction with components as detailed, finished to match.

C. Doors (Swinging)

1. Materials: Sections shall be extruded for 6063-T5 aluminum alloy (ASTM B221 - Alloy G.S. 10A T5).
2. Fasteners, where exposed, shall be aluminum, stainless steel or plated steel in accordance with ASTM A-164. Perimeter anchors shall be aluminum or steel, providing the steel is properly isolated from the aluminum.
3. Glazing gaskets shall be TPE or EPDM elastomeric extrusions.
4. Major portions of the door stiles shall be 0.125 inch in thickness and glazing molding shall be 0.050 inch thick.
5. Construction:
 - a. Stiles (vertical, top rail and bottom rail): Dimensions in accordance with door elevations on Drawings.
 - b. Thickness of stiles and rails: 1-3/4 inches.
 - c. Corner construction: Fillet weld and mechanical clip fastening.
6. Door shall be weatherstripped on 3 sides with metal-backed pile cloth installed in door and/or frame. Provide an integral adjustable (uninterrupted) dual weathering at meeting stiles of pairs of doors.
7. Hardware: Provide the following items:
 - a. Hinges, push-pulls, locks, closers, threshold, weatherstrip, and door bottom/sweep: Aluminum Door Manufacturer's standard.
 - b. Cylinder: As specified in Section 08 71 00.

D. Flashings and Miscellaneous Trim:

1. Provide interior sills, exterior sill (or subsills) with end dams, closures, flashings, trim and other elements in conjunction with or adjacent to framing system as required for watertightness and aesthetics. If sill frame does not provide means for conducting water out of the aluminum frame systems, then suitable flashings to ensure that water is conducted out of system shall be provided. Provide water diverters at ends of the horizontal mullion glazing pockets to drain water down the vertical mullion/hamb glazing pockets to sill can or flashing.
2. Fabricate miscellaneous trim from 0.060-inch-thick minimum aluminum (break metal) finished to match other components, except fabricate interior and exterior sills(or subsills) from 0.075-inch-thick minimum extruded aluminum (unless the sill or subsill is supporting the weight of the system and then a 0.125-inch thick minimum extruded aluminum shall be provided).

3. Flashings and sill can, in conjunction with mechanically fastened end dams and/or water diverters shall direct water entering the system to the outside of the building and shall not depend solely upon sealants.
- E. Hardware Installation at Factory:
1. Cut, reinforce, drill and tap frames as required to receive hardware except do not drill and tap for surface-mounted items until the time of installation at the Project Site. Comply with Hardware Manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.
 2. Install hardware, except surface-mounted hardware, at fabrication plant. Remove only as required for final finishing operations, and for delivery and installation of the Work at the Project Site.
- F. Aluminum Finishes:
1. Prepare the aluminum surfaces for finishing in accordance with the aluminum producer's recommendations and standards of the finisher or processor.
 2. Process components of each assembly in a manner to attain complete uniformity of color.
 3. Finish: Black anodized, Architectural Class I anodic coating conforming to Aluminum Association Designation AA-M-12 C22 A44.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other Work which affects, connects with, or will be concealed by this Work.

3.2 INSTALLATION

- A. Comply with Manufacturer's Specifications and recommendations for the installation of aluminum entrance and frames.
1. Furnish necessary material, labor, and equipment for the complete installation of the following: glass framing, vertical and horizontal mullions, transitional members connecting these components, adapters and mountings for trim moldings and facing materials.
 2. Set units plumb, level and true in line, without warp or rack of frames, doors or panels.
 3. Anchor securely in place.
 4. Separate aluminum and other corrodible metal surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
 5. Set sill members and other members in a bed of compound as shown, or with joint fillers or gaskets as shown to provide weathertight construction.
- B. Comply with Section 07 92 00 for sealants, compounds, fillers and gaskets to be installed integrally with aluminum entrances.
1. Seal joints in aluminum entrance and framing in a concealed manner, unless exposed sealant is indicated.
- C. Comply with Section 08 80 00 and Aluminum Entrance Manufacturers printed instructions for installation of glass shown to be glazed into aluminum entrances.

- D. Dimensions indicated are based on an assumed design temperature of 70 degrees F. Take into account the ambient temperature range at the time of fabrication and erection.
- E. Cut and trim component parts of the aluminum entrance and frames during erection only with the approval of the manufacturer or fabricator and in accordance with his recommendations. Do not cut through reinforcing members. Restore finish completely to protect material and remove evidence of cutting and trimming. Remove and replace members where cutting or trimming has impaired strength or appearance.
- F. Do not erect members which are warped, bowed, deformed or otherwise damaged to such extent as to impair strength or appearance. Remove and replace members damaged in the process of erection.

3.3 FIELD QUALITY CONTROL

- A. At Owner's request, test the entrance and framing system for water leaks in accordance with AAMA 501.2.94.

3.4 CLEANING

- A. Clean aluminum surfaces promptly after installation of frames, exercising care to avoid damage of the protective coating.
- B. Remove excess glazing and sealant compounds, dirt, and other substances.
- C. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

SECTION 08 51 13.13

ALUMINUM WINDOWS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Aluminum operable (casement and awning) windows.
- B. Related Sections:
 - 1. Section 08 41 13 - Aluminum Entrances and Window Wall.
 - 2. Section 08 71 00 - Door Hardware
 - 3. Section 08 80 00 - Glazing.

1.2 SYSTEM DESCRIPTION

- A. Performance Requirements: Windows shall be certified to meet ANSI/AAMA specified performance for structural, water resistance and air infiltration.
- B. Test Procedures and Performances
 - 1. Casement Windows shall conform to all AAMA/WDMA/CSA 101/I.S.2/A440 – 08 requirements.
 - 2. Awning (Projected) Windows shall conform to all ANSI/AAMA/NWWDA 101/I.S.2/NAFS-02 requirements.
 - 3. Life Cycle Testing: Test in accordance with AAMA 910. There shall be no damage to fasteners, hardware parts, support arms, activating mechanisms, or any other damage that would cause the window to be inoperable. Air infiltration and water resistance tests shall not exceed specified requirements.
 - 4. Air Infiltration Test
 - a. With ventilators closed and locked, test unit in accordance with ASTM E 283 at a static air pressure difference of 6.24 psf (299 Pa).
 - b. Air infiltration shall not exceed .10 cfm/SF (.50 l/s·m²) of unit.
 - 5. Water Resistance Test
 - a. With ventilators closed and locked, test unit in accordance with ASTM E 331/ASTM E 547 at a static air pressure difference of 15.0 psf (718 Pa).
 - b. There shall be no uncontrolled water leakage.
 - 6. Uniform Load Deflection Test
 - a. Casement Windows: With ventilators closed and locked, test unit in accordance with ASTM E 330 at a static air pressure difference of 110.0 psf (5266 Pa), positive and negative pressure.
 - b. Awning (Projected) Windows: With ventilators closed and locked, test unit in accordance with ASTM E 330 at a static air pressure difference of 65.0 psf (3112 Pa), positive and negative pressure.
 - c. No member shall deflect over L/175 of its span.
 - 7. Uniform Load Structural Test
 - a. Casement Windows: With ventilators closed and locked, test unit in accordance with ASTM E 330 at a static air pressure difference of 165.0 psf (7900), both positive and negative.
 - b. Awning (Projected) Windows: With ventilators closed and locked, test unit in accordance with ASTM E 330 at a static air pressure difference of 97.5 psf (4668 Pa), both positive and negative.

- c. At conclusion of test there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanisms, nor any other damage that would cause the window to be inoperable.
- 8. Forced Entry Resistance
 - a. Casement Windows: Windows shall be tested in accordance to ASTM F 588 or AAMA 1302.5 and meet the requirements of performance level 40.
 - b. Awning (Projected) Windows: Windows shall be tested in accordance to ASTM F 588 or AAMA 1302.5 and meet the requirements of performance level 10.
- 9. Condensation Resistance Test (CRF)
 - a. Test unit in accordance with AAMA 1503.1.
 - b. Condensation Resistance Factor (CRF) shall not be less than 43.
- 10. Condensation Resistance (CR)
 - a. With ventilators closed and locked, test unit in accordance with NFRC 500-2010.
 - b. Condensation Resistance (CR) shall not be less than 32.
- 11. Thermal Transmittance Test (Conductive U-Factor)
 - a. With ventilators closed and locked, test unit in accordance with NFRC 100-2010.
 - b. Conductive thermal transmittance (U-Factor) shall not be more than 0.64 BTU/hr•ft²•°F.

1.2 SUBMITTALS

- A. Product Data: Submit Manufacturer's Specifications and performance data.
- B. Shop Drawings: Submit Drawings showing elevations of each frame type, details, locations, size and thickness of materials, joints and connections, and installation requirements.
- C. Samples: Submit 2 samples of aluminum finish for approval.
- D. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 QUALITY ASSURANCE

- A. Standards:
 - 1. ANSI/AAMA 101, "Voluntary Specifications for Aluminum Prime Windows and Sliding Glass Doors."
 - 2. ANSI/AAMA 904.1, "Friction Hinges."
 - 3. ASTM E405, "Wear Testing Rotary Operators for Windows."
- B. Single Source Responsibility: Obtain entrances, window wall and operable windows, including finishes, used for this project through one source from a single manufacturer.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Storage: Adequately protect against damage while stored at the site.

- C. Handling: Comply with Manufacturer's instructions.

PART 2 PRODUCTS

2.1 MATERIALS, COMPONENTS AND ACCESSORIES – GENERAL

- A. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
- B. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.

2.2 MANUFACTURERS AND PRODUCTS

- A. General: Furnish products of EFCO, Monett, MO or equal, subject to compliance with specifications requirements.
- B. Thermal Windows:
 - 1. Casement Windows: Series 2700 Thermal windows as manufactured by EFCO or equal, AW-PG110-C Grade.
 - 2. Awning (Projected) Windows: Series 2700 Thermal windows as manufactured by EFCO or equal, AP-AW65 Grade.

2.3 MATERIALS

- A. Aluminum: Extrusions shall be 6063-T5 alloy and temper meeting ASTM B221 alloy G.S. 10A-T5.
- B. Fasteners: Where exposed shall be aluminum, stainless steel or zinc plated steel in accordance with ASTM A633. Perimeter (exposed) anchors shall be aluminum or steel, providing the steel is properly insulated from the aluminum.
- C. Aluminum Finishes:
 - 1. Prepare the aluminum surfaces for finishing in accordance with the aluminum producer's recommendations and standards of the finisher or processor.
 - 2. Process components of each assembly in a manner to attain complete uniformity of color.
 - 3. Finish: Black anodized, Architectural Class I anodic coating conforming to Aluminum Association Designation AA-M-12 C22 A44.
- D. Hardware:
 - 1. Weatherstripping: Santoprene® or equal.
 - 2. Locking handles shall be cam type and manufactured from a white bronze alloy with a US25D brushed finish.
 - 3. Operating Hardware: Concealed 4-bar, stainless steel arms.
- E. Thermal Barrier
 - 1. Exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.

2. The perimeter frame thermal barrier shall be thermal struts, consisting of glass reinforced polyamide nylon, mechanically crimped in raceways extruded in the exterior and interior extrusions.
 3. The sash and intermediate rails shall be poured and debridged thermal barrier made of two-part polyurethane.
- F. Screens (where shown on Drawings): Manufacturer's standard at operable units. Match window finish.
- G. Glazing: As specified in Section 08 80 00.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other Work which affects, connects with, or will be concealed by this Work.

3.2 INSTALLATION

- A. Install windows level, plumb, square, in alignment with adjacent Work, and in strict accordance with Manufacturer's printed instructions Securely anchor in place with fasteners of sufficient strength to properly hold the windows rigidly in place.
- B. Joints between metal window frames and masonry or stucco shall be tightly calked in order to ensure a watertight installation. Installation of windows into exterior insulation finish systems (EIFS) shall be carefully coordinated with EIFS installer to ensure a watertight installation
- C. Back paint aluminum sections with asphaltic paint where in contact with corrosive materials.
- D. Adjust hardware for proper operation.
- E. After installation, adequately protect exposed portions of window framing from damage by plaster lime, acid, paint or other harmful agents or elements.

3.3 CLEANING

- A. During the course of the Work and on completion of the Work, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- B. Clean metal surfaces after installation with plain water or water with soap or household detergent. No abrasive cleaning agents shall be used.
- C. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

SECTION 08 65 00

TUBULAR SKYLIGHTS

PART 1 GENERAL

1.1 SYSTEM DESCRIPTION

- 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: U.B.C. Standard 26-6. See ASTM D-1929.
 - c. Smoke Density - Rating no greater than 450 Per U.B.C. 8-1 (See 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: U.B.C. Standard 26-7. See ASTM D635.
 - e. Rate of Burn and/or Extent - Maximum Burn Extent: 1 inch (25 mm) Classification CC-1: U.B.C. Standard 26-7. See ASTM D635.

1.2 SUBMITTALS

- A. 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.
- B. Shop Drawings. Submit shop drawings showing layout, profiles and product components, including anchorage, flashings and accessories.
- C. Verification Samples: As requested by Architect and Resident Engineer.
- D. Test Reports: Independent testing agency or evaluation service reports verifying compliance with specified performance requirements.

- E. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Engaged in manufacture of tubular daylighting devices for minimum 2 years.

1.4 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.

1.5 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.

1.6 WARRANTY

- A. Daylighting Device: Manufacturer's standard warranty for 10 years.
- B. Electrical Parts: Manufacturer's standard warranty for 5 years, unless otherwise indicated.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS AND PRODUCTS

- A. Acceptable Manufacturer: Solatube International, Inc.; 2210 Oak Ridge Way, Vista, CA 92083, (888) 765-2882. www.solatube.com or equal.

2.2 MATERIALS, COMPONENTS AND ACCESSORIES – GENERAL

- A. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
- B. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.

2.3 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 ICBO/ICC AC-16.

- B. Tubular Skylight – 21 inch diameter (SolaMaster Series): Solatube Model 750 DS-C, 21 inch (530 mm) Daylighting System or equal:
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 inhibited, impact modified acrylic blend.
 - b. Inner Dome Glazing: Type DPI, 0.115 inch (3 mm) minimum thickness polycarbonate classified as CC1 material.
 - c. Roof Flashing Turret Extensions: Provide manufacturer's standard extensions for applications as requiring for units adjacent to PV panels or parapets, Type T24, additional lengths of 24 inches (600 mm) extension.
 2. Raybender 3000: Variable prism optic molded into outer dome to capture low angle sunlight and limit high angle sunlight.
 3. Roof Flashing Base: One piece, seamless, leak-proof flashing functioning as base support for dome and top of tube.
 - a. Base Material: Sheet steel, corrosion resistant conforming to ASTM A 653/A 653M or ASTM A 463/A 463M, 0.028 inch (0.7 mm) thick.
 - b. Base Style: Type F11, Self mounted, 11 inches (279 mm) high.
 - c. Flashing Insulator: Type FI, Thermal isolation material for use under flashing.
 4. 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.
 5. Dome Seal: Adhesive backed weatherstrip 0.63 inch (16 mm) tall by 0.28 inch (7 mm).
 6. Reflective Tubes: Aluminum sheet, thickness 0.018 inch (0.5 mm).
 - a. General:
 - 1) Interior Finish: Spectralight Infinity high reflectance specular finish on exposed reflective surface. Specular reflectance for visible spectrum (400 nm to 760 nm) greater than 99 percent. Total solar spectrum reflectance (400 nm to 2500 nm) less than 93 percent.
 - 2) Color: a* and b* (defined by CIE L*a*b* color model) shall not exceed plus 2 or be less than minus 2 as determined in accordance to ASTM E 308.
 - b. Top Tube Angle Adapter and Bottom Top Tube Angle Adapter Kit, Type AK:
 - 1) Reflective 30 degree adjustable top and bottom angle adapters (one each), 16 inches (406 mm) long
 - c. Extension Tube:
 - 1) Reflective extension tube, Type EXX, Notched for Open Ceiling diffuser attachment, 24 inches (610 mm) long
 7. Diffuser Assemblies: Gypsum Board and Suspended Ceiling Tile 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 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 0.100 inches (2.5 mm) thick. Classified as CC2.

8. 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.
 - a. 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.
 - b. 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.
 - c. Cable: Type CA, Two conductor low voltage cable (500 foot) for multiple unit DC connection.
 9. Provide other components/accessories as required for a complete installation.
- C. Tubular Skylight – 14 inch diameter (Brighten Up Series): Solatube Model 290 DS: 14 Inch (350 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 (3.25 mm) minimum thickness impact resistant injection molded acrylic classified as CC2 material; UV inhibiting, 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. LightTracker Reflector: Aluminum sheet, thickness 0.015 inch (0.4 mm) with Spectralight Infinity. Positioned in dome to capture low angle sunlight.
 2. Flashing Base: As applicable for installation to metal roofing.
 - a. One piece, seamless, leak-proof flashing functioning as base support for dome and top of tube.
 - b. Base Material: Sheet steel, corrosion resistant, meeting ASTM A 653/A 653M or ASTM A 463/A 463M, 0.028 inch (0.7 mm) thick.
 3. Tube Ring: Attached to top of base section; 0.090 inch (2.3 mm) nominal thickness injection molded high impact acrylic; to prevent thermal bridging between base flashing and tubing and channel condensed moisture out of tubing.
 4. Reflective Extension Tube: Aluminum sheet, thickness 0.015 inch (0.4mm).
 - a. Interior Finish: Spectralight Infinity high reflectance specular finish on exposed reflective surface. Visible spectrum (400 nm to 760 nm) greater than 99 percent. Total solar spectrum (400 nm to 2500 nm) less than 93 percent.
 - b. Color: a* and b* (defined by CIE L*a*b* color model) shall not exceed plus 2 or be less than minus 2 as determined in accordance to ASTM E 308.
 - c. Tube Diameter: Approximately 14 inches (356 mm).
 5. Reflective 30 degree Adjustable tube: Aluminum sheet, thickness .015 inch (0.4 mm)
 - a. Interior Finish: Spectralight Infinity high reflectance specular finish on exposed reflective surface. Visible spectrum (400 nm to 760 nm) greater than 99 percent. Total solar spectrum (400 nm to 2500 nm) less than 93 percent.
 6. Ceiling Ring: Injection molded impact resistant acrylic. Nominal thickness is 0.110 inches (2.8 mm).

7. Dual Glazed Diffuser Assembly:
 - a. Upper glazing: Acrylic plastic classified as CC2 material. The nominal thickness is 0.040 inches (1.020 mm).
 - b. Lower glazing (L1 Optiview): Acrylic plastic classified as CC2 material. The nominal thickness is 0.090 inches (2.29 mm).
 - c. Diffuser Trim Ring: Injection molded plastic, white trim (Vusion), L4.

2.4 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 and Resident Engineer 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 and Resident Engineer, or Contractor, or their designated representative. Correct if needed before proceeding with installation of subsequent units.
- C. Electrical: Provide power and controls to dimmer in accordance with Division 26 requirements.
- D. Construction Waste: In accordance with Section 01 74 19.

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

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SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes:
 - 1. Mechanical and electrified door hardware for:
 - a. Swinging doors.
 - b. Gates.
 - 2. Electronic access control system components, including:
 - a. Electronic access control devices.
- B. Exclusions: Unless specifically listed in hardware sets, hardware is not specified in this section for:
 - 1. Windows
 - 2. Cabinets (casework), including locks in cabinets
 - 3. Signage
 - 4. Toilet accessories
 - 5. Overhead doors
- C. Related Sections:
 - 1. Division 01 Section "Alternates" for alternates affecting this section.
 - 2. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
 - 3. Division 28 sections for coordination with other components of electronic access control system.

1.3 REFERENCES

- A. UL - Underwriters Laboratories
 - 1. UL 10B - Fire Test of Door Assemblies
 - 2. UL 10C - Positive Pressure Test of Fire Door Assemblies
 - 3. UL 1784 - Air Leakage Tests of Door Assemblies
 - 4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Key Systems and Nomenclature

C. ANSI - American National Standards Institute

1. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties

1.4 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 requirements.
2. Highlight, encircle, or otherwise specifically identify on submittals deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.
3. Prior to forwarding submittal, comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, "EXAMINATION" article, herein.

B. Action Submittals:

1. Product Data: Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
 - a. Wiring Diagrams: For power, signal, and control wiring and including:
 - 1) Details of interface of electrified door hardware and building safety and security systems.
 - 2) Schematic diagram of systems that interface with electrified door hardware.
 - 3) Point-to-point wiring.
 - 4) Risers.
3. Samples for Verification: If requested by Architect and Resident Engineer, submit production sample or sample installations of each type of exposed hardware unit in finish indicated, and tagged with full description for coordination with schedule.
 - a. Samples will be returned to supplier in like-new condition. Units that are acceptable to Architect and Resident Engineer may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
4. Door Hardware Schedule: Submit schedule with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule as published by the Door and Hardware Institute. Indicate complete designations of each item required for each door or opening, include:
 - a. Door Index; include door number, heading number, and Architect's hardware set number.
 - b. Opening Lock Function Spreadsheet: List locking device and function for each opening.
 - c. Type, style, function, size, and finish of each hardware item.

- d. Name and manufacturer of each item.
- e. Fastenings and other pertinent information.
- f. Location of each hardware set cross-referenced to indications on Drawings.
- g. Explanation of all abbreviations, symbols, and codes contained in schedule.
- h. Mounting locations for hardware.
- i. Door and frame sizes and materials.
- j. Name and phone number for local manufacturer's representative for each product.
- k. Operational Description of openings with any electrified hardware (locks, exits, electromagnetic locks, electric strikes, automatic operators, door position switches, magnetic holders or closer/holder units, and access control components).
Operational description should include how door will operate on egress, ingress, and fire and smoke alarm connection.
 - 1) Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work that is critical in Project construction schedule.

5. Key Schedule **[AS DIRECTED BY SD CITY LOCKSHOP]:**

- a. After Keying Conference, provide keying schedule listing levels of keying as well as explanation of key system's function, key symbols used and door numbers controlled.
- b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
- c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
- d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
- e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion.
 - 1) Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
- f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

6. Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified to be factory prepared for door hardware installation.

C. Informational Submittals:

- 1. Qualification Data: For Supplier, Installer and Architectural Hardware Consultant.
- 2. Product Certificates for electrified door hardware, signed by manufacturer:
 - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
- 3. Certificates of Compliance:
 - a. Certificates of compliance for fire-rated hardware and installation instructions if requested by Architect and Resident Engineer or Authority Having Jurisdiction.
 - b. Installer Training Meeting Certification: Letter of compliance, signed by Contractor, attesting to completion of installer training meeting specified in "QUALITY ASSURANCE" article, herein.

- c. Electrified Hardware Coordination Conference Certification: Letter of compliance, signed by Contractor, attesting to completion of electrified hardware coordination conference, specified in "QUALITY ASSURANCE" article, herein.
 - 4. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by qualified testing agency, for door hardware on doors located in accessible routes.
 - 5. Warranty: Manufacturer's standard warranty specified in this Section.
- D. Closeout Submittals:
- 1. Operations and Maintenance Data : Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Name, address, and phone number of local representative for each manufacturer.
 - d. Parts list for each product.
 - e. Final approved hardware schedule, edited to reflect conditions as-installed.
 - f. Final keying schedule
 - g. Copies of floor plans with keying nomenclature
 - h. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.
 - i. Copy of warranties including appropriate reference numbers for manufacturers to identify project.

1.5 QUALITY ASSURANCE

- A. Product Substitutions: Comply with product requirements stated in Division 01 and as specified herein.
 - 1. Where specific manufacturer's product is named and accompanied by "No Substitute," including make or model number or other designation, provide product specified. (Note: Certain products have been selected for their unique characteristics and particular project suitability.)
 - a. Where no additional products or manufacturers are listed in product category, requirements for "No Substitute" govern product selection.
 - 2. Where products indicate "acceptable manufacturers" or "acceptable manufacturers and products", provide product from specified manufacturers, subject to compliance with specified requirements and "Single Source Responsibility" requirements stated herein.
- B. Supplier Qualifications and Responsibilities: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that provides certified Architectural Hardware Consultant (AHC) available to Owner, Architect and Resident Engineer, and Contractor, at reasonable times during the Work for consultation.
 - 1. Warehousing Facilities: In Project's vicinity.
 - 2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
 - 3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

4. Coordination Responsibility: Coordinate installation of electronic security hardware with Architect and Resident Engineer and electrical engineers and provide installation and technical data to Architect and Resident Engineer and other related subcontractors.
 - a. Upon completion of electronic security hardware installation, inspect and verify that all components are working properly.

- C. Installer Qualifications: Qualified tradesmen, skilled in application of commercial grade hardware with record of successful in-service performance for installing door hardware similar in quantity, type, and quality to that indicated for this Project.

- D. Architectural Hardware Consultant Qualifications: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
 1. For door hardware, DHI-certified, Architectural Hardware Consultant (AHC).
 2. Can provide installation and technical data to Architect and Resident Engineer and other related subcontractors.
 3. Can inspect and verify components are in working order upon completion of installation.
 4. Capable of producing wiring diagrams.
 5. Capable of coordinating installation of electrified hardware with Architect and Resident Engineer and electrical engineers.

- E. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
 1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated.
 2. Manufacturers that perform electrical modifications and that are listed by testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

- F. Fire-Rated Door Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

- G. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.

- H. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release latch. Locks do not require use of key, tool, or special knowledge for operation.

- I. Accessibility Requirements: For door hardware on doors in an accessible route, comply with governing accessibility regulations cited in "REFERENCES" article, herein.
 1. Provide operating devices that do not require tight grasping, pinching, or twisting of wrist and that operate with force of not more than 5 lbf (22.2 N).

2. Maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
 - b. Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.
 - c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 3. Bevel raised thresholds with slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
 4. Adjust door closer sweep periods so that, from open position of 70 degrees, door will take at least 3 seconds to move to 3 inches (75 mm) from latch, measured to leading edge of door.
- J. Keying Conference [**COORDINATE WITH SD CITY LOCKSHOP**]: Conduct conference at Project site to comply with requirements in Division 01.
1. Attendees: Owner, Contractor, Architect and Resident Engineer, Installer, **[Owner's security consultant,]** and Supplier's Architectural Hardware Consultant.
 2. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
 - a. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - b. Preliminary key system schematic diagram.
 - c. Requirements for key control system.
 - d. Requirements for access control.
 - e. Address for delivery of keys.
- K. Pre-installation Conference: Conduct conference at Project site.
1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 2. Inspect and discuss preparatory work performed by other trades.
 3. Review required testing, inspecting, and certifying procedures.
- L. Coordination Conferences:
1. Installation Coordination Conference: Prior to hardware installation, schedule and hold meeting to review questions or concerns related to proper installation and adjustment of door hardware.
 - a. Attendees: Door hardware supplier, door hardware installer, Contractor.
 - b. After meeting, provide letter of compliance to Architect and Resident Engineer, indicating when meeting was held and who was in attendance.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
 1. Deliver each article of hardware in manufacturer's original packaging.

C. Project Conditions:

1. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
2. Provide secure lock-up for door hardware delivered to Project, but not yet installed. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

D. Protection and Damage:

1. Promptly replace products damaged during shipping.
2. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work.
3. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

E. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

F. Deliver keys[and permanent cores] to Owner by registered mail or overnight package service.

1.7 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.
- E. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.
- F. Direct shipments not permitted, unless approved by Contractor.

1.8 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Years from date of Substantial Completion, for durations indicated.
 - a. Closers:
 - 1) Mechanical: 30 years for LCN 4000 and 15 years for LCN Concealed
 - b. Exit Devices:
 - 1) Mechanical: 3 years.
 - c. Locksets:
 - 1) Mechanical: 3 years.
 - 2) Electrified: 1 year.
 - d. Key Blanks: Lifetime
 - 2. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. The Owner requires use of certain products for their unique characteristics and particular project suitability to insure continuity of existing and future performance and maintenance standards. After investigating available product offerings Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: "No Substitute."
 - 1. Where "No Substitute" is noted, submittals and substitution requests for other products will not be considered.
- B. Approval of manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.
- C. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- D. Hand of Door: Drawings show direction of slide, swing, or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.
- E. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's and Resident Engineer's approval.

2.2 MATERIALS

A. Fasteners

1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
 2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
 3. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect and Resident Engineer if thru-bolts are required.
 4. Install hardware with fasteners provided by hardware manufacturer.
- B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

2.3 HINGES

A. Provide three-knuckle, concealed bearing hinges.

1. Manufacturers and Products:
 - a. Scheduled Manufacturer and Product: Ives 3CB series
 - b. Acceptable Manufacturers and Products: Stanley or equal.

B. Requirements:

1. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
 - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
2. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
 - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
3. 2 inches or thicker doors:
 - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
4. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
5. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
6. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins

- c. Out-Swinging Exterior Doors: Non-removable pins
 - d. Out-Swinging Interior Lockable Doors: Non-removable pins
 - e. Interior Non-lockable Doors: Non-rising pins
7. Width of hinges: 4-1/2 inches (114 mm) at 1-3/4 inch (44 mm) thick doors, and 5 inches (127 mm) at 2 inches (51 mm) or thicker doors. Adjust hinge width as required for door, frame, and wall conditions to allow proper degree of opening.
 8. Doors 36 inches (914 mm) wide or less furnish hinges 4-1/2 inches (114 mm) high; doors greater than 36 inches (914 mm) wide furnish hinges 5 inches (127 mm) high, heavy weight or standard weight as specified.
 9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component.
 10. Provide mortar guard for each electrified hinge specified, unless specified in hollow metal frame specification.
 11. Provide spring hinges where specified. Provide two spring hinges and one bearing hinge per door leaf for doors 90 inches (2286 mm) or less in height. Provide one additional bearing hinge for each 30 inches (762 mm) of additional door height.

2.4 PIVOT SETS

A. Manufacturers:

1. Scheduled Manufacturer: Ives or equal
2. Acceptable Manufacturers: Stanley or equal

B. Requirements:

1. Provide pivot sets complete with oil-impregnated top pivot, unless indicated otherwise.
2. Where offset pivots are specified, Provide one intermediate pivot for doors less than 91 inches (2311 mm) high and one additional intermediate pivot per leaf for each additional 30 inches (762 mm) in height or fraction thereof. Intermediate pivots spaced equally not less than 25 inches (635 mm) or not more than 35 inches (889 mm) on center, for doors over 121 inches (3073 mm) high.
3. Provide appropriate model where pivot sets are scheduled at fire rated openings.
4. Provide lead-lined model where pivot sets are specified at lead-lined doors.
5. Provide pivots with electrified options as scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware. Locate electrified pivot nearest to electrified locking component. If manufacturer of electrified locking component requires another device for power transfer then provide recommended power transfer device and appropriate quantity of pivots.
6. Provide mortar guard for each electric pivot specified, unless specified in hollow metal frame specification.

2.5 FLUSH BOLTS

A. Manufacturers:

1. Scheduled Manufacturer: Ives or equal
2. Acceptable Manufacturers: DCI, Rockwood or equal

B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.6 COORDINATORS

A. Manufacturers:

1. Scheduled Manufacturer: Ives or equal
2. Acceptable Manufacturers: DCI, Rockwood or equal

B. Requirements:

1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers and surface vertical rod exit device strikes. Factory-prep coordinators for vertical rod devices if required.

2.7 MORTISE LOCKS NOT USED

2.8 EXIT DEVICES

A. Manufacturer and Product:

1. Scheduled Manufacturer: Von Duprin 98 series or equal
2. Acceptable Manufacturers and Products: No Substitute.

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1, UL certified to meet maximum 5 pound requirements according to the California Building Code section 11B-309.4 and UL listed for Panic Exit or Fire Exit Hardware. Cylinders: Refer to "KEYING" article, herein.
2. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
3. Quiet Operation: Incorporate fluid damper or other device that eliminates noise of exit device operation.
4. Touchpad: Extend minimum of one half of door width, but not the full length of exit device rail. Provide end-cap with two-point attachment to door. Match exit device finish, stainless steel for US26, US26D, US28, US32, and US32D finishes; and for all other finishes, provide compatible finish to exit device. Provide compression springs in devices, latches, and outside trims or controls; tension springs prohibited.
5. Provide rim devices with a dual cylinder or inside thumb turn cylinder option with a visual security indicator that identifies the trims locked/unlocked status of the door from the inside of the room. Indicator in unlocked state presents a 1/2 inch x 1/2 inch white metal flag with black icon at top of device head. Indicator in locked state has no flag present. Provide rim devices without the dual cylinder or inside thumb turn cylinder option capable of being retrofitted with the visual security indicator.

6. Provide exit devices with dead latching feature for security and for future addition of alarm kits and/or other electrical requirements.
7. Provide exit devices with manufacturer's approved strikes.
8. Provide exit devices cut to door width and height. Locate exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect and Resident Engineer.
9. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
10. Where lever handles are specified as outside trim for exit devices, provide heavy-duty lever trims with forged or cast escutcheon plates. Provide vandal-resistant levers that will travel to 90-degree down position when more than 35 pounds of torque are applied, and which can easily be re-set.
 - a. Lever Style: Match lever style of locksets.
11. Provide UL labeled fire exit hardware for fire rated openings.
12. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
13. Provide electrified options as scheduled in the hardware sets.

2.9 ELECTRONIC ACCESS CONTROL LOCKSETS

A. Manufacturers:

1. Scheduled Manufacturer: To establish standard of quality and design intent, electronic access control locksets and exit device trim specifications have been based on Schlage. Products of other manufacturers meeting or exceeding design and performance requirements specified herein will be considered for substitution subject to compliance with provisions of Division 01 Section "Product Requirements."
2. Scheduled Manufacturer and Product: Schlage CO series or equal.

B. Product: Schlage [CO-200-MS/MD] standalone mortise-type electronic locksets.

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1 Operational, Grade 1 Security, and manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance. Provide lock case that is field reversible for handing without opening case.
2. Backset: 2-3/4-inch (70 mm), nominal.
3. Latchbolt: 3-piece, beveled, stainless steel with 3/4-inch (19 mm) throw and anti-friction latch.
4. Deadbolt: Where deadbolt function is scheduled, provide stainless steel deadbolt interconnected with latch 1-5/8-inch (41 mm) high and 5/8-inch (16 mm) thick with 1-inch throw.
5. Chassis: ANSI/BHMA standard mortise lock prep for 1-3/4-inch (44 mm) doors

C. Requirements:

1. Provide offline electronic access control products that comply with the following requirements:
 - a. Listed, UL 294 - The Standard of Safety for Access Control System Units.
 - b. Compliant with ANSI/BHMA A156.25 Grade 1 Operation and Security.
 - c. Certified to UL10C, FCC Part15, Florida Building Code Standards TAS 201 large missile impact, TAS 202 and TAS 203.
 - d. Compliant with ASTM E330 for door assemblies.
 - e. Compliant with ICC / ANSI A117.1, NFPA 101, NFPA 80, and Industry Canada RSS-210.

2. Functions: Provide functions as scheduled that are field configurable without taking the offline electronic product off the door.
 3. Emergency Override: Provide mechanical key override; cylinders: Refer to "KEYING" article, herein.
 4. Levers:
 - a. Vandal Resistance: Exterior (secure side) lever rotates freely while door remains locked, preventing damage to internal lock components from vandalism by excessive force.
 - b. Provide non-handed lever trim that operates independently of non-locking levers.
 - c. Style: Sparta
 5. Power Supply: 4 AA batteries
 - a. Provide electronic access control locks and/or exit device trim with the ability to communicate battery status.
 6. Features:
 - a. Visual tri-colored LED indicators that indicate activation, operational systems status, system error conditions and low power conditions.
 - b. Visual bi-colored LED indicator on interior that is capable of indicating secured/unsecured status of device to occupants on interior.
 - c. Audible feedback that can be enabled or disabled.
 - d. Onboard processor with memory capacity of 2,000 users, 2,000 event audit history, up to 16 time zones and up to 32 calendar events.
 - e. Tamper-Resistant Screws: Tamper torx screws on inside escutcheon for increased security.
 7. Credential Reader:
 - a. Credential Reader Configurations:
 - 1) Keypad.
 - b. Credential Reader Capabilities: Provide credential readers capable of operating with the following integrated software partners.
 - 1) 12 button keypad with backlit buttons.
 8. Operation:
 - a. Provide electronic access control locks and/or exit device trim with the ability to be configured at door by handheld programming device the length of time device is unlocked upon access grant.
 - b. Provide electronic access control locks and/or exit device trim with the ability to communicate identifying information such as firmware versions, hardware versions, serial numbers, and manufacturing dates by handheld programming device.
- D. Components
1. Product: Schlage HHD series or equal with Utility Software.
 - a. Provide Handheld Programming Device for adaptable electronic access control products capable of the following minimum requirements.
 - 1) Capable of initializing lock and accessories using preloaded software.
 - 2) Utilized to field configure electronic access control devices, to download firmware updates and door files to device, and to download audit files from device.

2.10 CYLINDERS [EXISTING BEST KEY SYTEM, COORDINATE WITH SD CITYLOCKSHOP]

A. Manufacturers:

1. Scheduled Manufacturer: Best or equal

B. Requirements:

1. Provide cylinders/cores, from the same manufacturer of locksets, compliant with ANSI/BHMA A156.5; latest revision, Section 12, Grade 1; permanent cylinders; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.
2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
 - a. Conventional cylinder with Small Format Interchangeable Core (SFIC).
 - b. Keying: Manufacturer-keyed permanent cylinders/cores, configured into keying system per "KEYING" article herein.
 - c. Features: Cylinders/cores shall incorporate the following features.
3. Nickel silver bottom pins.
4. Project Cylinder/Core Distribution: Provide cylinders/cores complying with the following requirements in Project locations as indicated.
5. Replaceable Construction Cores.
 - a. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
 - 1) 12 construction change (day) keys.
 - b. Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2.11 KEYING [EXISTING BEST KEY SYTEM, COORDINATE WITH SD CITYLOCKSHOP]

- ### A. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - a. Keying system as directed by the Owner.
2. Forward biting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements shall be cause for replacement of cylinders/cores involved at no additional cost to Owner.
3. Provide keys with the following features.
 - a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
4. Identification:
 - a. Mark permanent cylinders/cores and keys with applicable blind code perDHI publication "Keying Systems and Nomenclature" for identification. Blind codemarks shall not include actual key cuts.
 - b. Identification stamping provisions must be approved by the Architect and Resident

- Engineer.
- c. Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
 - d. Failure to comply with stamping requirements shall be cause for replacement of keys involved at no additional cost to Owner.
 - e. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
5. Quantity: Furnish in the following quantities.
- a. Change (Day) Keys: 3 per cylinder/core.
 - b. Permanent Control Keys: 3.
 - c. Master Keys: 6.
 - d. Unused balance of key blanks shall be furnished to Owner with the cut keys.
 - e. Extra Keys:
 - 1) Presentation Keys (quantity as determined by Architect and Resident Engineer)
 - 2) Construction Keys (quantity as determined by Architect and Resident Engineer)

2.12 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: LCN 4040XP series or equal.

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2 inch (38 mm) diameter with 3/4 inch (19 mm) diameter double heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and back check.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearm for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.13 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer: Ives or equal.

2. Acceptable Manufacturers: Rockwood or equal.
- B. Requirements:
1. Provide push plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick and beveled 4 edges. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
 2. Provide push bars of solid bar stock, diameter and length as scheduled. Provide push bars of sufficient length to span from center to center of each stile. Where required, mount back to back with pull.
 3. Provide offset pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
 4. Provide flush pulls as scheduled. Where required, provide back-to-back mounted model.
 5. Provide pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
 6. Provide pull plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick, beveled 4 edges, and prepped for pull. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
 7. Provide wire pulls of solid bar stock, diameter and length as scheduled.
 8. Provide decorative pulls as scheduled. Where required, mount back to back with pull.

2.14 PROTECTION PLATES

- A. Manufacturers:
1. Scheduled Manufacturer: Ives or equal.
 2. Acceptable Manufacturers: Rockwood or equal.
- B. Requirements:
1. Provide kick plates, mop plates, and armor plates minimum of 0.050 inch (1 mm) thick as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
 2. Sizes of plates:
 - a. Kick Plates: 10 inches (254 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
 - b. Mop Plates: 4 inches (102 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
 - c. Armor Plates: 36 inches (914 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

2.15 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

- A. Manufacturers:
1. Scheduled Manufacturers: Glynn-Johnson or equal.
 2. Acceptable Manufacturers: Sargent or equal.
- B. Requirements:
1. Provide heavy duty concealed mounted overhead stop or holder as specified for exterior and interior vestibule single acting doors.
 2. Provide heavy duty concealed mounted overhead stop or holder as specified for double acting doors.
 3. Provide heavy or medium duty and concealed or surface mounted overhead stop or holder for interior doors as specified. Provide medium duty surface mounted overhead

stop for interior doors and at any door that swings more than 140 degrees before striking wall, open against equipment, casework, sidelights, and where conditions do not allow wall stop or floor stop presents tripping hazard.

4. Where overhead holders are specified provide friction type at doors without closer and positive type at doors with closer.

2.16 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives or equal.
2. Acceptable Manufacturers: Rockwood or equal.

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.
2. Where a wall stop cannot be used, provide universal floor stops for low or high rise options.
3. Where wall or floor stop cannot be used, provide medium duty surface mounted overhead stop.

2.17 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer: NGP or equal.
2. Acceptable Manufacturers: Pemko, Zero International or equal.

B. Requirements:

1. Provide thresholds, weatherstripping (including door sweeps, seals, astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.
2. Size of thresholds::
 - a. Saddle Thresholds: 1/2 inch (13 mm) high by jamb width by doorwidth
 - b. Bumper Seal Thresholds: 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

2.18 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives or equal.
2. Acceptable Manufacturers: Rockwood or equal.

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.19 MAGNETIC HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer: LCN or equal.
2. Acceptable Manufacturers: Rixson, Sargent or equal.

B. Requirements:

1. Provide wall or floor mounted electromagnetic door release as specified with minimum of 25 pounds of holding force. Coordination projection of holder and armature with other hardware and wall conditions to ensure that door sits parallel to wall when fully open. Wire magnetic holders on fire-rated doors into the fire control panel for fail-safe operation.

2.20 DOOR POSITION SWITCHES

A. Manufacturers:

1. Scheduled Manufacturer: Schlage or equal.
2. Acceptable Manufacturers: GE-Interlogix, Sargent or equal.

B. Requirements:

1. Provide recessed or surface mounted type door position switches as specified.
2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

2.21 LATCH PROTECTORS

A. Manufacturers:

1. Scheduled Manufacturer: Ives or equal.
2. Acceptable Manufacturers: Rockwood or equal.

B. Provide latch protectors of type required to function with specified lock.

2.22 COAT HOOKS

A. Manufacturers:

1. Scheduled Manufacturer: Ives or equal.
2. Acceptable Manufacturers: Burns, Rockwood or equal.

B. Provide coat hooks as specified.

2.23 FINISHES

A. Finish: BHMA 626/652 (US26D); except:

1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. Continuous Hinges: BHMA 630 (US32D)
3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
4. Protection Plates: BHMA 630 (US32D)
5. Overhead Stops and Holders: BHMA 630 (US32D)
6. Door Closers: Powder Coat to Match
7. Wall Stops: BHMA 630 (US32D)
8. Latch Protectors: BHMA 630 (US32D)

9. Weatherstripping: Clear Anodized Aluminum
10. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 2. Custom Steel Doors and Frames: HMMA 831.
 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- D. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- H. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches (750 mm) of door height greater than 90 inches (2286 mm).
- I. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 1. Replace construction cores with permanent cores as indicated in keying section.
 2. **OPTION: Furnish permanent cores to Owner for installation.**

- J. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- K. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Closers shall not be visible in corridors, lobbies and other public spaces unless approved by Architect and Resident Engineer.
- L. Closer/holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- M. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- N. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- O. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- P. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- Q. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.3 FIELD QUALITY CONTROL

- A. Architectural Hardware Consultant: Engage qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
 - 1. Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
 - 2. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DEMONSTRATION

- A. Provide training for Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

3.7 DOOR HARDWARE SCHEDULE

- A. Locksets, exit devices, and other hardware items are referenced in the following hardware sets for series, type and function. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.

HW SET: 01

3	EA	HINGE	3CB1 4.5 X 4.5 NRP	630	IVE
1	EA	PANIC HARDWARE	98L 996L	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	SURFACE CLOSER	P1461 HCUSH	689	LCN
1	EA	KICK PLATE	8400-B4E-CS-10" X 2"LDW	630	IVE
1	EA	FLOOR STOP	FS444	626	IVE
1	SET	SEAL	BY ALUMINUM FRAME MFGR		

SEALS, THRESHOLDS BY MILGARD PREHUNG DOORMFG.

HW SET: 02

6	EA	HINGE	3CB1 4.5 X 4.5 NRP	630	IVE
1	SET	CONST LATCHING BOLT	FB61P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	CLASSROOM LOCK	L9070T 17A X VTQP KEYWAY X STK 7/8"LTC	630	SCH
1	EA	ASTRAGAL	139SS	630	NGP
2	EA	OVERHEAD HOLDER	450H SERIES	630	GLY
1	SET	SEAL	284Q - KERF-IN @ H&J		NGP
2	EA	DOOR SWEEP	200NA	CL	NGP
1	EA	THRESHOLD	653	AL	NGP

KEYING SHALL BE SDG&E QUAD KEYWAY BYSCHLAGE

HW SET: 03

3	EA	HINGE	3CB1 4.5 X 4.5 NRP	630	IVE
1	EA	DEADLOCK	48H7K	626	BES
1	EA	MORTISE CYLINDER	1E74	626	BES
1	SET	SEAL	284Q - KERF-IN @ 4 SIDES		NGP

HW SET: 04

3	EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1	EA	PANIC HARDWARE	98L-BE 996L-BE	626	VON
1	EA	SURFACE CLOSER	P1461	689	LCN
1	EA	KICK PLATE	8400-B4E-CS-16" X 1"LDW	630	IVE
1	EA	WALL STOP	WS407CCV	619	IVE

HW SET: 05

3	EA	HINGE	3CB1 4.5 X 4.5	630	Hager
1	EA	PRIVACY LOCK	L9496T 17AL583-363	630	SCH
1	EA	COIN TURN	09-900-XL12-196 NH (COIN TURNCYL)	626	SCH
1	EA	SURFACE CLOSER	1461	689	LCN
1	EA	KICK PLATE	8400-B4E-CS-10" X 2"LDW	630	IVE
1	EA	WALL STOP	WS407CCV	619	IVE
1	EA	RESTROOM SIGN	SBH12U X SB444	BLU	SBH

HW SET: 06

3	EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1	EA	PRIVACY LOCK	L9496T 17AL583-363	630	SCH
1	EA	COIN TURN	09-900-XL12-196 NH (COIN TURNCYL)	626	SCH
1	EA	SURFACE CLOSER	1461	689	LCN
1	EA	KICK PLATE	8400-B4E-CS-10" X 2"LDW	630	IVE
1	EA	DOME STOP	FS436	619	IVE
1	EA	RESTROOM SIGN	SBH12U X SB444	BLU	SBH

HW SET: 07

3	EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1	EA	PASSAGE SET	L9010 17A	630	SCH
1	EA	SURFACE CLOSER	1461	689	LCN
1	EA	KICK PLATE	8400-B4E-CS-10" X 2"LDW	630	IVE
1	EA	WALL STOP	WS407CCV	619	IVE

HW SET: 08

3	EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1	EA	PASSAGE SET	L9010 17A	630	SCH
1	EA	OVERHEAD STOP	450S SERIES	630	GLY

HW SET: 09

3	EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1	EA	PRIVACY LOCK	L9496T 17AL583-363	630	SCH
1	EA	COIN TURN	09-900-XL12-196 NH (COIN TURN CYL)	626	SCH
1	EA	KICK PLATE	8400-B4E-CS-10" X 2"LDW	630	IVE
1	EA	WALL STOP	WS407CCV	619	IVE

HW SET: 10

3	EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1	EA	PASSAGE SET	L9010 17A	630	SCH
1	EA	KICK PLATE	8400-B4E-CS-10" X 2"LDW	630	IVE
1	EA	WALL STOP	WS407CCV	619	IVE

HW SET: 11

3	EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1	EA	PASSAGE SET	L9010 17A	630	SCH
1	EA	OVERHEAD STOP	450S SERIES	630	GLY
1	EA	KICK PLATE	8400-B4E-CS-10" X 2"LDW	630	IVE

HW SET: 12 - NOT USED

3	EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1	EA	PASSAGE SET	L9010 17A	630	SCH
1	EA	OVERHEAD STOP	450S SERIES	630	GLY
1	EA	KICK PLATE	8400-B4E-CS-10" X 2"LDW	630	IVE

HW SET: 13

3	EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1	EA	PASSAGE SET	L9010 17A	630	SCH
1	EA	WALL STOP	WS407CCV	619	IVE

HW SET: 14

6	EA	HINGE	3CB1 4.5 X 4.5	630	IVE
2	EA	SGL DUMMY TRIM	L0170 17A	630	SCH
2	EA	ROLLER LATCH	RL30-F (TOP MOUNT)	626	IVE
2	EA	OVERHEAD HOLDER	810H SERIES	630	GLY

HW SET: 15

6	EA	HINGE	3CB1 4.5 X 4.5	630	IVE
2	EA	SGL DUMMY TRIM	L0170 17A	630	SCH
2	EA	ROLLER LATCH	RL30-F (TOP MOUNT)	626	IVE
2	EA	OVERHEAD HOLDER	810H SERIES	630	GLY

HW SET: 16

ALL HARDWARE BY DOOR MANUFACTURER

HW SET: 17

ALL HARDWARE BY DOOR MANUFACTURER SEALS, THRESHOLDS BY MILGARD PREHUNG DOOR MFG. PROVIDE LOCKING FOR SLIDING DOOR CAPABLE OF ACCEPTING KEY CYLINDER BY BEST LOCK

END OF SECTION

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SECTION 08 80 00

GLAZING

PART 1 GENERAL

1.1 SUMMARY

- A. Related Sections:
1. Section 08 11 13 - Steel Doors and Frames
 2. Section 08 14 00 - Wood Doors
 2. Section 08 41 13 - Aluminum Entrances and Window Walls.
 3. Section 08 51 13.13 - Aluminum Windows

1.2 PERFORMANCE REQUIREMENTS

- A. Glass and glazing materials shall provide continuity of building enclosure vapor and air barrier.
1. To utilize the inner pane of multiple pane sealed units for the continuity of air and vapor seal.
 2. Maintain continuous air and vapor barrier throughout glazed assembly from glass pane to heel bead of glazing sealant.
- B. Glass thickness indicated is minimum and shown for detailing only. Size glass to withstand dead loads and positive and negative live loads acting normal to plane of glass as calculated in accordance with IBC Chapter 24, as measured in accordance with ANSI/ASTM E330.
- C. Limit glass deflection to 1/175 or flexure limit of glass, with full recovery of glazing materials, whichever is less.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's Product Data for glass units, including the following:
1. Structural, physical and environmental characteristics.
 2. Size limitations.
 3. Special handling or installation requirements
 4. Special application requirements for glazing materials.
 5. Available colors of glass and glazing materials with color selections.
- B. Samples: Submit samples as follows:
1. Two samples 8 x 8 inch in size, illustrating glass units, coloration and design.
 2. Four inch long bead of glazing sealant, color as selected.
- C. Manufacturer's Certificate: Submit Manufacturer's certification that sealed insulated glass meets or exceeds specified requirements.
- D. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

- E. Calculations: Submit calculations to verify that the exterior glazing thickness complies with ASTM E1300 in accordance with IBC 2404.1.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Conform to IBC Chapter 24, to local requirements and to State law.
- B. Standards:
 - 1. ANSI/ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 - 2. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
 - 3. GANA'S - Glazing Manual and Laminated Glass Design Guide.
- C. Perform Work in accordance with GANA Glazing Manual, GANA Sealant Manual, and Laminators Safety Glass Association - Standards Manual for Glazing Installation Methods.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Storage: Adequately protect against damage while stored at the site.
- C. Handling: Comply with Manufacturer's instructions.

1.6 WARRANTY

- A. Provide 10 year Manufacturer's standard warranty for sealed glass units from seal failure, interpane dusting or misting, and replacement of same.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Glass Materials: Furnish products of one of the following Manufacturers, except as approved by the Architect and Resident Engineer, subject to compliance with Specification requirements:
 - 1. PPG Industries. www.ppg.com (Basis of Design)
 - 2. Viracon. www.viracon.com.
 - 3. Guardian Industries. www.guardian.com.
 - 4. Oldcastle Glass Group. www.oldcastleglass.com.
 - 5. Pilkington LOF. www.pilkington.com.
 - 6. Visteon Float Glass www.visteon.com.
 - 7. Or equal.

2.2 MATERIALS – GENERAL

- A. Provide regional materials in accordance with Regional Materials provisions of Section 01 60 00.

2.3 GLASS MATERIALS

- A. Exterior:
1. Minimum 1" insulated glazing units at all exterior windows.
 2. Provide warm-edge spacer where available for specified window type and manufacturer to limit potential for condensation.
 3. Provide glazing with minimal shading coefficient and highest VLT to maintain SHGC.
 4. Provide equivalent insulated units at vision panels in exterior doors.
 5. Provide as tempered or heat strengthened where required by code.
 6. Basis of design: PPG Solarban 60 or equal with clear inner lite and solarbronze outer lite:
 - a. U-value per Title 24 Energy Calculations
 - b. VLT per Title 24 Energy Calculations
 - c. SHGC per Title 24 Energy Calculations
- B. Interior (Non-Fire Rated):
1. Float Glass: Clear, 1/4" thick, ASTM C1036, Type 1 transparent flat, Class 1.
 2. Tempered Float Glass (where required by Building Code): 1/4" thick, clearfully tempered glass conforming to ASTM C 1048.
 3. Wire Glass: ASTM C1036, Type II patterned and wired flat, Class 1 translucent, Quality q8 glazing; square mesh, 1/4 inch thick.
- C. Interior (Fire Rated): Provide one of the following as applicable. Doors shall have glazing that has impact resistance meeting CPSC 16CFR1201 (Cat. I or II).
1. FireLite Plus Premium (polished surfaces), 60 minute fire rated, 3/16 inch thick, as manufactured by Technical Glass Products, Nippon Electric Glass Co., Ltd. www.fireglass.com or equal.
 2. Superlite I-XL, 60 minute fire rated, optically clear, 1/4 inch thick, as manufactured by SAFTI (Safety and Fire Technology International), San Francisco, CA (800) 822-2088 www.safti.com or equal.
- D. Interior Mirror Glass: ASTM C1036, Type 1 transparent flat, Class 1 clear, Quality q1 mirror select; 1/4 inch thick, sizes noted on Drawings. Provide full width mirror with polished edges (no frames).
- E. Interior Laminated Glass: 2 layers of 3/16 inches around 0.060 Safeflex inner layer, clear or equal.

2.4 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene or other resilient blocks of 70 to 90 Shore A durometer hardness tested for compatibility with glazing sealant, minimum length 4 inches.
- B. Spacers: Neoprene blocks of 40 to 50 Shore A durometer hardness, adhesive backed on one face only and tested for compatibility with specified glazing sealant.
- C. Glazing Gaskets: As specified in Section 08 41 13.
- D. Interior Glazing Compound:
1. Polymerized Butyl Rubber and Inert Fillers (pigments), solvent based with minimum 75% solids, non-sag consistency, tack-free time of 24 hours or less, paintable non-staining.
 2. In accordance with the low-emitting materials requirements of Section 01 60 00-Product Requirements.

- E. Exterior Glazing Compound: Conforming to ASTM C920, Type S, Grade NS, Use G. Compound shall be paintable, or colored to match frame.
- F. Glazing Tape: Preshimmed 10 percent solids, non-shrinking, butyl rubber tape compatible with sealants. If exposed, tape shall be paintable, or colored to match frame.
- G. Butt Glazing Sealant:
 - 1. Interior:
 - a. GE 1200 Series Silicone, clear or equal.
 - b. In accordance with the low-emitting materials requirements of Section 01 60 00 – Product Requirements.
 - 2. Exterior: GE 1200 Series Silicone, gray or equal.
- H. Mirror Mastic: Polymer type mirror mastic (compliant with the low-emitting materials requirements of Section 01 60 00 – Product Requirements) resistant to water, shock, cracking, vibration and thermal expansion. Mastic shall be compatible with mirror backing paint and approved by mirror manufacturer.
- I. Mirror Vandal-Resistant Film: Scratchgard® as manufactured by ShatterGARD Glass Protection Films®, Inc. (888) 306- 7998 www.shattergard.com or equal. All mirrors in project are to have Mirror Vandal-Resistant Film

2.7 MARKINGS

- A. Tempered glass shall have each light permanently etched with Manufacturer's name and his compliance with ANSI Z-97.1.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Examine framing or glazing channel surfaces, backing, removable stop design, and conditions under which glazing is to be performed.
- C. Coordination: Coordinate with other Work which affects, connects with, or will be concealed by this Work.

3.2 INSTALLATION

- A. Comply with combined recommendations of Glass Manufacturer, aluminum frame manufacturer and manufacturer of sealants and other materials used in glazing., except where more stringent requirements are shown or specified.
- B. Clean the glazing, channel, or other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to the substrate.
- C. Do not attempt to cut, seam, nip or abrade glass which is tempered or heat strengthened.
- D. Comply with "Glazing Manual" by GANA, except as shown and specified otherwise by Manufacturers of glass and glazing materials.

- E. Inspect each piece of glass immediately before installation, and discard those which have observable edge damage or face imperfections.
- F. Install setting blocks of proper size at quarter points of sill rabbet.
- G. Provide spacers inside and out, and of proper size and spacing, for glass sizes larger than 50 united inches. Provide 1/8 inch minimum bite of spacers on glass and use thickness equal to sealant width.
- H. Unify appearance of each series of lights by setting each piece to match others as nearly as possible. Inspect each piece and set with pattern, draw and bow oriented in the same direction as other pieces.
- I. Miter cut and bond ends together at corners where gaskets are used for channel glazing, so that gaskets will not pull away from corners and result in voids or leaks in the glazing system.

3.3 EXTERIOR COMBINATION METHOD (TAPE AND SEALANT)

- A. Clean contact surfaces with solvent.
- B. Cut glazing tape to proper length and set against permanent stops, 3/16 inch below sightline. Weld corners together by butting tape and dabbing with sealant.
- C. Apply bed of sealant along exterior void ensuring full contact with glass.
- D. Place setting blocks at 1/4 points.
- E. Rest glass on setting blocks and push against tape (and heel bead of sealant) with sufficient pressure to ensure full contact and adhesion at perimeter.
- F. Install removable stops, spacer strips inserted between glass and applied stops at 2-foot intervals, 1/4 inch below sightline. Place glazing tape on glass with tape flush with sightline.
- G. Fill gap between glass and applied stop with sealant to depth equal to bite of frame on glass but not more than 3/8 inch below sightline.
- H. Apply cap bead of sealant along exterior void, to uniform and level line, flush with sightline. Tool or wipe cap bead surface with solvent for smooth appearance.

3.4 INTERIOR COMBINATION METHOD (TAPE AND SEALANT)

- A. Cut glazing tape to proper length and install against permanent stop, projecting 1/16 inch above sightline.
- B. Place setting blocks at 1/4 point.
- C. Rest glass on setting blocks and push against tape with sufficient pressure to ensure full contact and adhesion at perimeter.
- D. Install removable stops; spacer strips inserted between glass and applied stops at 2 foot intervals, 1/4 inch below sightline.

- E. Fill gap between glass and applied stop with sealant to depth equal to bite of frame on glass to uniform and level line.
- F. Neatly trim off excess tape to sightline.

3.5 ADHESIVE INSTALLATION OF MIRRORS

- A. Apply mirror mastic to cover not more than 25 percent of back of mirror.
- B. Set mirror in support on setting blocks or continuous gasket, and press against substrate to ensure bond of adhesive.
- C. Leave open ventilation space, 1/8 inch or more in thickness between mirror and substrate, over 75 percent of mirror area (wherever there is no adhesive).

3.6 ADJUSTING

- A. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in any other way during the construction period, including natural causes, accidents and vandalism.

3.7 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- B. Remove labels after Work is completed.
- C. Construction Waste: In accordance with Section 01 74 19.

3.8 PROTECTION

- A. Protect glass from breakage immediately upon installation, by attachment of crossed streamers to framing held away from glass.
- B. Do not apply markers of any type to surfaces of glass.

END OF SECTION

SECTION 09 05 61

COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. This section applies to all floors identified in the contract documents as to receive the following types of floor coverings:
 - 1. Resilient tile and sheet.
 - 2. Carpet tile.
 - 3. Thin-set ceramic tile and stone tile.
 - 4. Resinous Flooring
- B. Removal of existing floor coverings.
- C. Preparation of new concrete floor slabs for installation of floor coverings.
- D. Testing of concrete floor slabs for moisture and alkalinity (pH).
- E. Testing of existing concrete floor slabs for moisture and alkalinity (pH) has already been conducted; test report is attached.
- F. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
 - 1. Contractor shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.

1.2 RELATED REQUIREMENTS

- A. Section 014000 - Quality Requirements: Additional requirements relating to testing agencies and testing.
- B. Section 017419 - Construction Waste Management and Disposal: Handling of existing floor coverings removed.

1.3 REFERENCES

- A. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete; 1999 (Reapproved 2014).
- B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- C. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2011.
- D. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2011.
- E. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; Resilient Floor Covering Institute; October 2011.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

1.5 SUBMITTALS

- A. Visual Observation Report: For existing floor coverings to be removed.

- B. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
 - 1. Moisture and alkalinity (pH) limits and test methods.
 - 2. Manufacturer's required bond/compatibility test procedure.
- C. Testing Agency's Report:
 - 1. Description of areas tested; include floor plans and photographs if helpful.
 - 2. Summary of conditions encountered.
 - 3. Moisture and alkalinity (pH) test reports.
 - 4. Copies of specified test methods.
 - 5. Recommendations for remediation of unsatisfactory surfaces.
 - 6. Include certification of accuracy by authorized official of testing agency.
 - 7. Submit report to Architect.
 - 8. Submit report not more than two business days after conclusion of testing.
- D. Adhesive Bond and Compatibility Test Report.
- E. Copy of RFCI (RWP).
- F. Remedial Materials Product Data: Manufacturer's published data on each product to be used for remediation.
 - 1. Manufacturer's qualification statement.
 - 2. Test reports indicating compliance with specified performance requirements, performed by nationally recognized independent testing agency.
 - 3. Manufacturer's installation instructions.
 - 4. Specimen Warranty: Copy of warranty to be issued by coating manufacturer and certificate of underwriter's coverage of warranty.

1.6 QUALITY ASSURANCE

- A. Moisture and alkalinity (pH) testing will be performed by an independent testing agency employed and paid by Owner.
- B. Contractor may perform adhesive and bond test with his own personnel or hire a testing agency.
- C. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
 - 1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.
- D. Contractor's Responsibility Relating to Independent Agency Testing:
 - 1. Provide access for and cooperate with testing agency.
 - 2. Confirm date of start of testing at least 10 days prior to actual start.
 - 3. Allow at least 4 business days on site for testing agency activities.
 - 4. Achieve and maintain specified ambient conditions.
 - 5. Notify Architect when specified ambient conditions have been achieved and when testing will start.
- E. Remedial Coating Installer Qualifications: Company specializing in performing work of the type specified in this section, trained by or employed by coating manufacturer, and able to provide at least 3 project references showing at least 2 years' experience installing moisture emission coatings.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, handle, and protect products in accordance with manufacturer's instructions and recommendations.
- B. Deliver materials in manufacturer's packaging; include installation instructions.

- C. Keep materials from freezing.

1.8 FIELD CONDITIONS

- A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F (18 degrees C) or more than 85 degrees F (30 degrees C).
- B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
 - 1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
 - 2. Latex or polyvinyl acetate additions are permitted; gypsum content is prohibited.
 - 3. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.
- B. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.
- C. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
 - 1. Thickness: 1/8 inch (3.2 mm), maximum.
 - 2. If testing agency recommends any particular products, use one of those.
 - 3. Products:
 - a. ARDEX Engineered Cements; ARDEX MC ULTRA with ARDEX FEATHERFINISH: www.ardexamericas.com.
 - b. Floor Seal Technology, Inc; MES 100 with Floor Seal FloorCem SLU: www.floorseal.com.
 - c. Koster American Corporation; Koster VAP I 2000 with Koster SL Premium overlay: www.kosterusa.com.
 - d. ProSpec, an Oldcastle brand; Moisture Guard Max: www.prospec.com.

PART 3 EXECUTION

3.1 CONCRETE SLAB PREPARATION

- A. Follow recommendations of testing agency.
- B. Perform following operations in the order indicated:
 - 1. Existing concrete slabs (on-grade and elevated) with existing floor coverings:
 - a. Visual observation of existing floor covering, for adhesion, water damage, alkaline deposits, and other defects.
 - b. Removal of existing floor covering.
 - 2. Preliminary cleaning.
 - 3. Anhydrous calcium chloride test; 3 tests in the first 1000 square feet (100 square meters) and one test in each additional 1000 square feet (100 square meters), unless otherwise indicated or required by flooring manufacturer.

4. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
5. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
6. Specified remediation, if required.
7. Patching, smoothing, and leveling, as required.
8. Other preparation specified.
9. Adhesive bond and compatibility test.
10. Protection.

C. Remediations:

1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating over entire suspect floor area.
3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.2 REMOVAL OF EXISTING FLOOR COVERINGS

- A. Comply with local, State, and federal regulations and recommendations of RFCI Recommended Work Practices for Removal of Resilient Floor Coverings, as applicable to floor covering being removed.
- B. Dispose of removed materials in accordance with local, State, and federal regulations and as specified.

3.3 PRELIMINARY CLEANING

- A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.
- B. Do not use solvents or other chemicals for cleaning.

3.4 MOISTURE VAPOR EMISSION TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F1869 and as follows.
- D. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet (1.4 kg per 93 square meters) per 24 hours.
- E. Report: Report the information required by the test method.

3.5 ANHYDROUS CALCIUM CHLORIDE TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with: ASTM F 1869 and as follows:
 - 1. Install MVE-control system in locations where concrete substrate MVER exceeds 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
- D. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 5 lb of water/1000 sq. ft. (2.67 kg of water/92.9 sq. m).
- E. Report: Report the information required by the test method.

3.6 INTERNAL RELATIVE HUMIDITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F2170 Procedure A and as follows:
 - 1. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.
- D. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.
- E. Report: Report the information required by the test method.

3.7 ALKALINITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the Contractor's convenience.
- C. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized water.
- D. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch (25 mm) in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.8 PREPARATION

- A. See individual floor covering section(s) for additional requirements.
- B. Comply with recommendations of testing agency.
- C. Comply with requirements and recommendations of floor covering manufacturer.
- D. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.
- E. Do not fill expansion joints, isolation joints, or other moving joints.

3.9 ADHESIVE BOND AND COMPATIBILITY TESTING

- A. Comply with requirements and recommendations of floor covering manufacturer.

3.10 APPLICATION OF REMEDIAL FLOOR COATING

- A. Comply with requirements and recommendations of coating manufacturer.

3.11 PROTECTION

- A. Cover prepared floors with building paper or other durable covering.

END OF SECTION

SECTION 09 21 16

AIR RENEW M2 TECH TYPE X GYPSUM BOARD

PART 1 — GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Moisture and mold resistant gypsum board which reduces volatile organic compounds (VOC).
 - 2. Moisture and mold resistant joint treatment.
 - 3. Abuse and impact resistant gypsum boards which reduce volatile organic compounds (VOC), specifically formaldehyde and other aldehydes.

1.3 REFERENCES

- A. ASTM C 473: Standard Test Methods for Physical Testing of Gypsum Panel Products
- B. ASTM C 475: Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board
- C. ASTM C 514: Standard Specification for Nails for the Application of Gypsum Board
- D. ASTM C 840: Standard Specification for the Application and Finishing of Gypsum Board
- E. ASTM C 954: Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in (0.84 mm) to .112 in (2.84 mm) in Thickness
- F. ASTM C 1002: Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
- G. ASTM C 1396: Standard Specification for Gypsum Board
- H. ASTM D 1629: Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels
- I. ASTM D 3273: Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
- J. ASTM E 119: Standard Test Methods for Fire Tests of Building Construction and Materials
- K. ASTM G 21: Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
- L. CAN/ULC-S101: Fire Endurance Tests of Building Construction and Materials
- M. CAN/CSA-A82.20 Series: Methods of Testing Gypsum and Gypsum Products
- N. CAN/CSA-A82.27: Gypsum Board
- O. CAN/CSA-A82.31: Gypsum Board Application
- P. Gypsum Association: GA-216 "Application and Finishing of Gypsum Panel Products"
- Q. Gypsum Association: GA-214 "Recommended Levels of Gypsum Board Finish"
- R. ISO 16000-23-Indoor Air: Performance test for evaluating reduction of formaldehyde concentrations by sorptive building materials.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 00.
- B. Product Data: For each type of product indicated.
- C. Informational Submittals: Submit manufacturer's instructions, special procedures, and perimeter conditions requiring special attention.

1.5 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 (UL 263, CAN/ULC-S101) by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by design designations from ULI and ULC "Fire Resistance Directory" and Products Certified for Canada.
 - 2. Fire-Resistance Ratings: Indicated by design designations from Intertek Testing Services (formerly Warnock Hersey International) *Directory of Listed Products*.
- B. Abuse and Impact Resistant Characteristics: For abuse and impact resistance levels, provide materials tested to achieve the level of abuse or impact resistance required per ASTM C 1629.
- C. Single Source Responsibility: Except where specified otherwise, obtain gypsum board products, joint treatment, and accessories from single manufacturer or from manufacturers recommended by prime manufacturer of gypsum board products.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials protected against damage from weather, direct sunlight, surface contamination, construction traffic, or other causes.
 - 1. Store CertainTeed AirRenew[®] Gypsum Board panels in flat stacks to prevent sagging.
 - 2. Protect CertainTeed Joint Compounds from freezing.
 - 3. Protect materials to keep them dry.
 - 4. Protect CertainTeed AirRenew[®] Gypsum Board panels to prevent damage to edges, ends, and surfaces.

PART 2 — PRODUCTS

2.1 VOC REDUCING MOISTURE AND MOLD RESISTANT GYPSUM BOARD

- A. Acceptable Manufacturers
 - 1. CertainTeed Gypsum, Inc.
 - a. Basis of Design: CertainTeed AirRenew[®] Gypsum Board
 - 2. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick where indicated and as otherwise required to meet fire rating for specific element
 - 3. Size: 48 by not less than 96 inches (1220 by not less than 2440 mm)
 - 4. Surface Paper: 100% recycled moisture and mold resistant paper on face, back and long edges.
 - 5. Mold Resistance Rating:
 - a. Score of 10 (best possible) tested in accordance with ASTM D 3273
 - b. Rating of 0 (best possible) tested in accordance with ASTM G 21
 - 6. GREENGUARD Children & SchoolsSM-Certification.

2.2 VOC REDUCING MOISTURE AND MOLD RESISTANT GYPSUM BOARD, ABUSE RESISTANT

- A. Acceptable Manufacturers

1. CertainTeed Gypsum, Inc.
 - a. Basis of Design: CertainTeed AirRenew® Extreme Abuse Board
2. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick where indicated and otherwise required to meet fire rating for specific element as
3. Size: 48 by not less than 96 inches (1220 by not less than 2440 mm)
4. Surface Paper: 100% recycled moisture and mold resistant paper on face, back and long edges.
5. Mold Resistance Rating:
 - a. Score of 10 (best possible) tested in accordance with ASTM D 3273
 - b. Rating of 0 (best possible) tested in accordance with ASTM G 21
6. GREENGUARD Children & SchoolsSM-Certification.
7. ASTM 1629 Classification Levels
 - a. Surface Abrasion: Level 3
 - b. Surface Indention: Level 1
 - c. Soft Body Impact: Level 2
 - d. Hard Body Impact: Level 1

2.3 VOC REDUCING MOISTURE AND MOLD RESISTANT GYPSUM BOARD, IMPACT RESISTANT

A. Acceptable Manufacturers

1. CertainTeed Gypsum, Inc.
 - a. Basis of Design: CertainTeed AirRenew® Extreme Impact Board
2. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick where indicated and otherwise required to meet fire rating for specific element as
3. Size: 48 by not less than 96 inches (1220 by not less than 2440 mm)
4. Surface Paper: 100% recycled moisture and mold resistant paper on face, back and long edges.
5. Mold Resistance Rating:
 - a. Score of 10 (best possible) tested in accordance with ASTM D 3273
 - b. Rating of 0 (best possible) tested in accordance with ASTM G 21
6. GREENGUARD Children & SchoolsSM-Certification.
7. ASTM 1629 Classification Levels
 - a. Surface Abrasion: Level 3
 - b. Surface Indention: Level 1
 - c. Soft Body Impact: Level 3
 - d. Hard Body Impact: Level 3

2.4 MOISTURE AND MOLD RESISTANT SETTING-TYPE JOINT COMPOUND

A. Acceptable Manufacturers

1. CertainTeed Gypsum, Inc.
 - a. Basis of Design: "CertainTeed Moisture and Mold Resistant Setting Compound with M2Tech®"
2. Packaging: 18 lbs.
3. Mold Resistance Rating:
 - a. Score of 10 (highest possible) tested in accordance with ASTM D 3273
4. GREENGUARD Children & SchoolsSM-Certification.
5. Substitutions: Submit in accordance with Section 01 60 00.

2.5 MOLD RESISTANT GLASS FIBER DRYWALL TAPE

A. Acceptable Manufacturers

1. Saint-Gobain Adfors
 - a. Basis of Design: "FibaTape Mold-X10™"

2. Dimensions: 1-7/8 inches (48 mm) wide by 300 feet (91440 mm) long
3. Mold Resistance Rating:
 - a. Score of 10 (highest possible) tested in accordance with ASTM D 3273
4. Substitutions: Submit in accordance with Section 01 60 00.

2.6 TRIMS AND ACCESSORIES

- A. General: Except as otherwise specifically indicated, provide trim and accessories by manufacturer of gypsum board materials, made of galvanized steel or zinc alloy and configured for concealment in joint compound.
 1. Include corner beads, edge trim, and other units necessary for project conditions. Provide accessories as required in order to achieve details indicated, whether or not specific accessories are shown on the drawings.

2.7 MISCELLANEOUS

- A. Fasteners:
 1. Screws for attaching gypsum board to light gauge steel (minimum 20 gauge with abuse and impact versions) and wood framing members:
 - a. Type [S] [W] Drywall Screws per ASTM C 1002.
 - i. Length: minimum 1-1/4" (32 mm)
 2. Nails for attaching gypsum board to wood framing and furring:
 - a. Nails per ASTM C 514.
 - i. Length: minimum 1-3/8" (35 mm)

PART 3 — EXECUTION

3.1 MOISTURE AND MOLD RESISTANT GYPSUM BOARD INSTALLATION

- A. Comply with GA-216, ASTM C 840 and manufacturer's written instructions.
- B. Install CertainTeed AirRenew® Gypsum Board with light violet paper side facing the interior.
- C. Cut boards at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.
 1. Install boards with a ¼ inch (6 mm) setback at wall-to-floor intersections.
 2. Allow no joints greater than 1/8 inch (3 mm).
- D. Apply fasteners so screw/nail heads bear tightly against light violet colored face paper; countersink slightly and avoid damaging face paper.
- E. Space wall framing members a maximum of [16 inches (400 mm) o.c. for ½" gypsum board] [24 inches (600 mm) o.c. for 5/8" gypsum board]
- G. Horizontal Installation: Install gypsum board with long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of stud flanges, and stagger end joints of adjacent boards not less than one stud spacing. Screw/nail-attach boards at perimeter and within field of board to each stud.
 1. Space fasteners approximately 8 inches (200 mm) o.c. (or tighter spacing if recommended by manufacturer for specific application) and set back a minimum of 3/8 inch (10 mm) from edges and ends of boards.

3.2 MOISTURE AND MOLD RESISTANT JOINT TREATMENT

1. Apply mold resistant glass fiber joint tape to all joints and interior angles.
 - a. Embed taped joints and interior angles with minimum one coat of moisture and mold resistant setting compound. Coat fastener heads with one coat of moisture and mold resistant setting compound.
 - i. [Specify the appropriate Level of Finish per area or wall type]
2. Level of Finish per GA-216:
 - a. Level I: All joints and interior angles set in joint compound.

- b. Level II: One coat on all joints and interior angles; fastener heads covered with one coat of joint compound.
- c. Level III: One coat on all joints and interior angles; fastener heads and accessories covered with two coats of joint compound.
- d. Level IV: All joints and interior angles have tape embedded in joint compound. Two additional coats on all joints and interior angles. Fastener heads and accessories covered with two separate coats of joint compound.
- e. Level V: Final skim coating of all surfaces; recommended where gloss paints and/or critical lighting will be experienced.

SAFETY:

For more information, consult the Material Safety Data Sheet by contacting CertainTeed at 1-800-233-8990 or email: building.solutions@certainteed.com. For an electronic copy of this specification, please visit: www.certainteed.com/gypsum

SECTION 09 22 16

METAL SUPPORT ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Formed metal stud framing, furring, suspension systems and accessories as shown on Drawings and as specified.

1.2 SYSTEM DESCRIPTION

- A. Interior walls shall be non-load bearing studs for walls going to ceiling and load bearing steel studs (as specified in Section 05 41 00) for walls going to structure.
 - 1. Studs: 3-5/8", 22 gauge metal studs conforming to ASTM C-645. Use 20 gauge for walls to receive ceramic tile and for walls over 14 feet high or unless otherwise called for in drawings.
 - 2. Metal Furring Channels: 22 gage galvanized steel with a face width of 1-3/8 inch and furring depth to match insulation thickness (see Section 07 21 00).

1.3 SUBMITTALS

- A. Product Data: Submit data describing standard framing member materials and finish, product criteria, load charts, limitations, and installation instructions.
- B. Certificates: Mill Certification shall be provided with shipment to verify chemical composition, yield strength, tensile strength, elongation and coating thickness. Include listing of applicable ASTM standards specified in this section and comparison of ASTM requirements to actual materials provided to jobsite.
- C. Manufacturer's letter: Manufacturer shall provide letter stating that the material supplied to the specific project meets or exceed the performance standards listed in these specifications.
- D. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ASTM C 754 requirements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Furnish products as manufactured by a manufacturing member of the Steel Stud Manufacturers Association (SSMA) or equal, subject to compliance with Specification requirements.

2.2 FRAMING MATERIALS

- A. General
1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 2. Provide regional materials in accordance with Regional Materials provisions of Section 01 60 00.
- B. Studs, Runners and Furring Channels:
1. ASTM C 645, electro-galvanized to meet ASTM A 591, manufactured from steel supplied in accordance with ASTM A 653, Structural Quality Grade 33; G60 designation galvanized sheet steel.
 2. Thickness: In accordance with stud schedule provided herein.
 3. Deflection Track:
 - a. Slotted Top Track (non-fire rated and fire-rated, as applicable): SLP-TRK® as manufactured by Sliptrack Systems (888) 475-7875 www.BradyInnovations.com, as distributed by Cemco (800) 775-2362 (western U.S) and Unimast Inc. (800) 654-7883 (eastern U.S.) or equal, gauge as per ICBO ER-5344, Table 2. Provide fire rated assemblies in accordance with manufacturer's literature, where applicable.
 - b. Non-Fire Rated Slotted Top Track - Single Track Slip System for Interior Partitions: As manufactured by Metal Lite, Inc., 3070 E. Miraloma Avenue, Anaheim, CA 92806 (800) 886-6824 or equal. Provide for partitions that are not required to be fire rated.
 4. Curved Stud and Track Components: Custom curved stud and track components as manufactured by RadiusTrack Corporation, 6612 Lyndale Avenue So., Suite 2, Richfield, MN 55423 (888) 872-3487 or equal.
- C. Studs: C-shaped, non-load bearing rolled steel, punched for utility access, of size shown on Drawings.
- D. Ceiling Runners: Cold or hot-rolled steel, meet ASTM C 754.
- E. Hanger and Tie Wire: Meet ASTM C 754.
- F. Furring and Bracing Members: Of same gauge, material and finish as studs, thickness to suit purpose.
- G. Clips, Brackets: Galvanized wire or sheet metal designed for attachment of framing, furring and bridging members.
1. Deflection Clips: If acceptable to Building Official, VertiClip™ as manufactured by Signature Industries, LLC, P.O. Box 68005, Raleigh, NC 27613 (919) 844-0789 or equal may be provided for attachment of framing to roof and floor construction at head and slide conditions. Provide sizes as required for stud depth(s). Clips shall be manufactured of steel conforming to ASTM A 653 Prime Certified G60 galvanized material or better, 50 ksi yield strength and 65 ksi ultimate strength. Deflection clips to have positive attachment to structure and stud material while allowing for frictionless movement.
 2. Bridging Clips: If acceptable to Building Official, BridgeClip™ as manufactured by Signature Industries, LLC, P.O. Box 68005, Raleigh, NC 27613 (919) 844-0789 or equal may be provided for attachment of bridging to studs.
- H. Fasteners: GA 203, self-drilling, self-tapping screws.
- I. Anchorage Devices: Power driven, powder actuated, drilled expansion bolts or screws with sleeves as required for positive anchorage.

- J. Acoustic Sealant: As specified in Section 07 92 20.
- K. Primer: FS TT-P-645, for touch-up of galvanized surfaces.
- L. Backing: "Notch-Tite" and "Flush Mount" as manufactured by Metal Lite, Inc., 3070 E. Miraloma Avenue, Anaheim, CA 92806 (800) 886-6824 or equal.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that conditions are ready to receive Work.
- B. Verify field measurements are as shown on Drawings.
- C. Verify that rough-in utilities are in proper location.
- D. Beginning of installation means acceptance of substrate.

3.2 METAL STUD ERECTION

- A. Install stud framing in accordance with ASTM C 754.
- B. Align and secure top and bottom runners at 24 inches o.c. Place two beads of acoustic sealant between runners and substrate.
- C. Fit runners under and above openings; secure intermediate studs at spacing of wall studs.
- D. Install studs vertically at 16 inches on center; unless indicated otherwise on Drawings. Place two beads of acoustic sealant between studs and adjacent vertical surfaces. Install felt strips between wall and stud where studs abut exterior walls.
- E. Connect studs to tracks using fastener method.
- F. Door Opening Framing: Install double studs at door frame jambs. Install stud tracks on each side of opening, at frame head height, and between studs and adjacent studs.
- G. Backing and Blocking: Provide backing and blocking attached to studs. Bolt or screw steel channels to studs. Install backing and blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, and hardware. If proprietary system is used, install in accordance with manufacturer's printed instructions.
- H. Coordinate installation of bucks, anchors, blocking, electrical and mechanical Work placed in or behind partition framing.
- I. Splice studs with 8 inch nested lap, secure each stud flange with flush head screw.
- J. Construct corners using minimum three studs.
- K. Brace stud framing system and make rigid.
- L. Coordinate erection of studs with requirements of door and window frame supports and attachments.

- M. Align stud web openings.
- N. Refer to Drawings for indication of partitions extending to ceiling only and for partitions extending through ceiling to structure above. Maintain clearance under structural building members to avoid deflection transfer to studs. Provide nested extended leg ceiling runners, deflection clips or proprietary slip track.
- O. Coordinate placement of insulation in multiple stud spaces made inaccessible after stud framing erection.

3.3 WALL FURRING INSTALLATION

- A. Erect wall furring for direct attachment to structural walls.
- B. Erect furring channels vertically. Secure in place on alternate channel flanges at maximum 24 inches.
- C. Space furring channels maximum 16 inches on center, not more than 4 inches from floor and ceiling lines, and butting walls.
- D. Install furring channels directly attached to structural walls, as applicable in accordance with Manufacturer's instructions.
- E. Erect free-standing metal stud framing tight to concrete, concrete and brick masonry walls, attached by adjustable furring brackets in accordance with Manufacturer's instructions.

3.4 ACOUSTICAL AND FIRE RATINGS

- A. Install framing and furring as required for indicated acoustical and fire ratings.

3.5 CEILING FRAMING INSTALLATION

- A. Install in accordance with ASTM C 754.
- B. Coordinate location of hangers with other Work.
- C. Install ceiling framing independent of walls, columns and above-ceiling Work.
- D. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing. Extend bracing minimum 24 inches beyond each end of openings.
- E. Laterally brace entire suspension system.
- F. No hanger support shall be allowed from roof deck.
- G. At steel beams, joists or other steel construction wrap hangers around, inset through, or clip or bolt to the supports, so as to develop the full strength of the hangers.
- H. At lights or other openings that interrupt the main runner or furring channels reinforce grillage with 3/4 inch cold-rolled channels, wire tied atop and parallel to the main runner channels.

I. Do not bridge control and expansion joints with metal furring. Provide separate supports on each side of joint.

J. Fabricate and bend curved furring to required curves and radii in the shop.

3.6 FIELD QUALITY CONTROL

A. Testing: At Owner's request, Contractor shall provide spot testing of actual properties of steel framing to verify compliance with specifications.

3.7 CLEANING

A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.

B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

SECTION 09 22 36.23

METAL LATH

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal lath for Portland cement and gypsum plaster.
- B. Metal lath and integral weather barrier for thin brick masonry.

1.2 RELATED REQUIREMENTS

- A. Section 061000 - Rough Carpentry: Sheathing on exterior walls.
- B. Section 072500 - Weather Barriers: Weather barrier under exterior plaster and stucco.
- C. Section 092216 - Non-Structural Metal Framing.
- D. Section 092400 - Portland Cement Plastering.

1.3 REFERENCE STANDARDS

- A. ASTM C841 - Standard Specification for Installation of Interior Lathing and Furring; 2003 (Reapproved 2013).
- B. ASTM C847 - Standard Specification for Metal Lath; 2014a.
- C. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
- D. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster; 2014b.
- E. ICC-ES AC308 - Acceptance Criteria for Water-Resistive Barriers; ICC Evaluation Service, Inc.; 2011.

1.4 SUBMITTALS

- A. Product Data: Provide data on furring and lathing components, structural characteristics, material limitations, and finish.

1.5 QUALITY ASSURANCE

- A. Maintain one copy of each specified installation standard on site throughout the duration of lathing and plastering work.
- B. Installer Qualifications: Company specializing in performing the work of this Section a minimum two years documented experience.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers - Metal Lath:
 - 1. CEMCO; California Expanded Metal Products Co.
 - 2. ClarkDietrich Building Systems.
 - 3. Dietrich
 - 4. Niles Building Products.
 - 5. Worthington Industries.

2.2 LATH MATERIALS

- A. Diamond Mesh Metal Lath: ASTM C847, galvanized; self-furring.
 - 1. Weight: To suit application, comply with deflection criteria, and as specified in ASTM C841 for framing spacing.
 - a. Minimum Weight: 3.4 lb/sq yd (1.8 kg/sq m).
 - 2. Backed with treated paper complying with requirements of ICC-ES AC38 Grade D.
 - 3. Applications: Use at vertical wall surfaces at masonry substrate locations.
- B. Flat Rib Metal Lath: ASTM C847, galvanized; 1/8 inch (3 mm) thick.
 - 1. Weight: To suit application, comply with deflection criteria, and as specified in ASTM C841 for framing spacing.
 - a. Minimum Weight: 3.4 lb/sq yd (1.8 kg/sq m).
 - 2. Backed with treated paper complying with requirements of ICC-ES AC38 Grade D.
 - 3. Applications: Use at soffits and other horizontal surfaces.
- C. Beads, Screeds, Joint Accessories, and Other Trim: Depth governed by plaster thickness, maximum possible lengths.
 - 1. Material: Formed sheet steel with rust inhibitive primer, expanded metal flanges.
 - 2. Casing Beads: Square edges.
 - a. Acceptable Product: No. 66X Expanded Flange Casing Bead manufactured by Clark Western.
 - 3. Corner Beads: Square corners.
 - a. Acceptable Product: No. 1A Expanded Corner Bead manufactured by Clark Western.
 - 4. Interior Corners: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized-zinc coating.
 - a. Acceptable Product: Cornerite manufactured by Clark Western.
 - 5. Sill (Weep) Screeds: Bevelled edges; minimum 3-1/2 inch vertical attachment flange.
 - a. Acceptable Product: No. 7 Foundation Sill Screed manufactured by Clark Western.
 - 6. Base (Weep) Screeds: Square edges; minimum 3-1/2 inch vertical attachment flange.
 - a. Acceptable Product: No. 36X Expanded Base Screed manufactured by Clark Western.
 - 7. Expansion Joints: Two-piece sliding type with reveal, 4 inch (101.6 mm) wide expanded flanges.
 - a. Acceptable Product: No. 40 Expansion Joint manufactured by Clark Western.
 - 8. Control Joints: Accordion profile with protective tape, 2 inch (50 mm) flanges.
 - a. Acceptable Product: No. 15 and No. 30 (corner) Control Joint manufactured by Clark Western.

2.3 ACCESSORIES

- A. Anchorage: Tie wire, nails, and other metal supports, of type and size to suit application; to rigidly secure materials in place, galvanized.
- B. Fasteners: ASTM C1002 self-piercing tapping screws; length required to penetrate minimum 3/4 inch into framing or solid backing, or as required by ASTM C1063, whichever is greater length.
- C. Air Barrier: Specified in Section 072500.
- D. Tie Wire: Annealed galvanized steel.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that substrates are ready to receive work and conditions are suitable for application.
- C. For exterior plaster and stucco on stud walls, verify that weather barrier has been installed over sheathing substrate completely and correctly.

- D. Do not begin until unacceptable conditions have been corrected.
- E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 INSTALLATION - GENERAL

- A. Install interior lath and furring in accordance with ASTM C841.
- B. Install lath for Portland cement plaster in accordance with ASTM C1063.
 - 1. Fastener Spacing: Space fasteners 6 inch on center vertically, or as otherwise required by reference standard requirements.
- C. Install lath and furring for fire-rated assemblies in accordance with the requirements of the indicated assembly.

3.3 CONTROL AND EXPANSION JOINTS

- A. Locate joints as indicated on Drawings.
 - 1. Control Joint Spacing: Maximum 12 feet (4 m) on center.
 - 2. Expansion Joint Spacing: Maximum 30 feet (10 m) on center.
- B. Install control and expansion joints using specified accessories, where indicated.
 - 1. Cut primary lath continuously along centerline of expansion joints.
 - 2. Wire-tie expanded flanges of accessories to primary lath; screw fasteners not permitted for this purpose.

3.4 ACCESS PANELS

- A. Install access panels and rigidly secure in place.
- B. Install frames plumb and level in opening. Secure rigidly in place.
- C. Position to provide convenient access to concealed work requiring access.

3.5 LATH INSTALLATION

- A. Apply metal lath taut, with long dimension perpendicular to supports.
- B. Lap ends minimum 1 inch (25 mm). Secure end laps with tie wire where they occur between supports.
- C. Attach metal lath to concrete masonry using wire hair pins. Attach anchors to backup surface; space at maximum 24 inches (600 mm) on center.
- D. Continuously reinforce internal angles with corner mesh, except where the metal lath returns 3 inches (75 mm) from corner to form the angle reinforcement; fasten at perimeter edges only.
- E. Place corner bead at external wall corners; fasten at outer edges of lath only with wireties.
- F. Place base screeds at termination of plaster areas; secure rigidly in place.
- G. Place 4 inch (100 mm) wide strips of metal lath centered over junctions of dissimilar backing materials. Secure rigidly in place.
- H. Place lath vertically above each top corner and each side of door frames to 6 inches (150 mm) above ceiling line.
- I. Place casing beads at terminations of plaster finish. Butt and align ends. Secure rigidly in place.
- J. Place additional strip mesh diagonally at corners of lathed openings. Secure rigidly in place.

3.6 TOLERANCES

- A. Maximum Variation from True Lines and Levels: 1/8 inch in 10 feet (3 mm in 3 m).

B. Maximum Variation from True Position: 1/8 inch (3 mm).

END OF SECTION

SECTION 09 24 00

PORTLAND CEMENT PLASTER (STUCCO)

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Section Includes: Integral colored stucco over fiberglass faced gypsum sheathing panels.
- B. Related Sections:
 - 1. Section 07 42 43.13 - Solid Composite Exterior Wall Panel Systems: Exterior panel dry system over breathable underlayment membrane over fiberglass faced gypsum sheathing panels.

1.2 SUBMITTALS

- A. Product Data:
 - 1. Provide Manufacturer's data on plaster materials, characteristics and limitations, and installation instructions.
 - 2. Provide product data for weather resistive barrier including manufacturer's specifications, technical data and installation instructions. Submit manufacturer certification that weather resistive barrier product furnished meet specification requirements.
- B. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 QUALITY ASSURANCE

- A. Comply with applicable requirements of the following, except where more stringent requirements are specified or required by local building codes:
 - 1. ML/SFA 920, "Guide Specifications for Metal Lathing and Furring."
 - 2. ASTM C926, "Standard Specification for the Application of Portland Cement-Based Plaster."
 - 3. Provide weather resistive barriers that are manufactured in accordance with ICC approval acceptable to authorities having jurisdiction as a weather resistive barrier.
- B. Field Samples: Make 2 samples, each 3 feet square at locations directed by Architect and Resident Engineer, for each specified stucco finish and color. Sample which has been reviewed and accepted by Architect and Resident Engineer may remain as part of the Work.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Portland Cement Plaster
 - 1. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
 - 2. Storage: Adequately protect against damage while stored at the site.
 - 3. Handling: Comply with Manufacturer's instructions.
- B. Weather Resistive Barrier:
 - 1. Packing and Shipping: Deliver materials to site in manufacturer's original unopened packaging with labels intact.
 - 2. Storage: Store off ground to assure adequate ventilation, and protect against damage while stored at the site.
 - 3. Handling: Comply with manufacturer's instructions.
- C. Gypsum Sheathing:
 - 1. Packing and Shipping: Deliver materials to site in manufacturer's original unopened packaging with labels intact.
 - 2. Storage: Store panels flat in an enclosed shelter providing protection from damage and exposure to the elements.

1.5 PROJECT/SITE CONDITIONS

- A. Perform Work only when existing and forecasted weather conditions are within the limits established by the Manufacturer of the materials and products used.
- B. Proceed with installation only when substrate construction and preparation Work is complete, dry and in condition to receive weather resistive barrier.
- C. Do not apply plaster when substrate or ambient air temperature is less than 50 degrees F. nor more than 80 degrees F.
- D. Maintain minimum ambient temperature of 50 degrees F. during and after installation of plaster.
- E. During hot weather protect stucco from uneven and excessive evaporation.

1.6 WARRANTY

- A. Gypsum Sheathing:
 - 1. Provide products that offer twelve months of coverage against in-place exposure damage (delamination, deterioration and decay).
 - 2. Manufacturer's Standard Warranty: Five years against manufacturing defects.

PART 2 PRODUCTS

2.1 PLASTER MATERIALS

- A. General:
 - 1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 - 2. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
- B. Water: Clean and free of deleterious matter.

- C. Portland Cement: Conform to ASTM C150, Type I or II.
- D. Hydrated Lime: Conform to ASTM C207, Type S.
- E. Aggregate shall be clean, well graded sand or screenings from crushed stone or slag, and shall conform to ASTM C33 for fine aggregate except that it shall be graded within the following limitations:
 - 1. Passing No. 4 sieve: 100 percent
 - 2. Passing No. 8 sieve: 90 percent
 - 3. Passing No. 16 sieve: 60 percent-90 percent
 - 4. Passing No. 30 sieve: 35 percent-70 percent
 - 5. Passing No. 50 sieve: 10 percent-30 percent
 - 6. Passing No. 100 sieve: 5 percent
- F. Bonding Agent: ASTM C31; type recommended for bonding stucco to concrete and concrete masonry.
- G. Color: Integral color pigment, custom color as selected by Architect and Resident Engineer, suitable for use in Portland cement plaster.

2.2 SHEATHING AND WEATHER-RESISTIVE BARRIER

- A. General
 - 1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 - 2. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
- B. Gypsum Sheathing: Fire-Rated Fiberglass-Mat Faced Gypsum Sheathing conforming to ASTM C1177, Type X:
 - 1. Thickness: 5/8 inch.
 - 2. Width: 4 feet.
 - 3. Length: 8 feet, 9 feet or 10 feet as applicable to project requirements.
 - 4. Weight: 2.5 lb/sq. ft.
 - 5. Edges: Square.
 - 6. Surfacing: Fiberglass mat on face, back, and long edges.
 - 7. Racking Strength (Ultimate, not design value) (ASTM E72): Not less than 654 pounds per square foot, dry.
 - 8. Flexural Strength, Parallel (ASTM C1177): 100 lbf, parallel.
 - 9. Humidified Deflection (ASTM C1177): Not more than 1/8 inch.
 - 10. Permeance (ASTM E96): Not more than 17 perms.
 - 11. R-Value (ASTM C518): 0.67.
 - 12. Mold Resistance (ASTM D3273): 10, in a test as manufactured.
 - 13. Microbial Resistance (ASTM D6329, GREENGUARD 3-week protocol): Will not support microbial growth.
 - 14. Acceptable Product: 5/8 inch DensGlass Fireguard Sheathing, Georgia-Pacific Gypsum or equal
 - 15. Fasteners: ASTM C1002, corrosion resistant treated screws.

- C. Weather Resistive Barrier:
1. Weather resistive barrier composed of either cross-laminated polyolefin films, woven polyolefin strands, or spunbonded polyolefin fibers, coated or uncoated, with or without perforations to transmit water vapor but not liquid water complying with UBC Standard 14-1 or ICC approved alternative:
 - a. Thickness: 3 mils minimum.
 - b. Water Vapor Transmission: 10 perms minimum as tested per ASTM E96, Procedure A.
 - c. Flame Spread: Maximum of 25 per ASTM E84.
 - d. Minimum Allowable Exposure: 3 months.
 2. Furnish one of the following products, except as approved by the Architect and Resident Engineer, subject to compliance with specification requirements:
 - a. Tuff Wrap as manufactured by Celotex www.usg.com
 - b. Tyvek CommercialWrap as manufactured by Dupont
 - c. Or equal.
 3. Fasteners:
 - a. Nails: Standard round wire shingle type, hot dipped zinc coated steel, minimum 13/64 inch head diameter, or with plastic washer heads, and 0.080 inch shank diameter, of sufficient length to penetrate into wall studs.
 - b. Staples: Standard wide face staples, hot dipped zinc coated steel, minimum 1 inch crown, of sufficient length to penetrate into wallstuds.
Screws: Steel drill screws with washers complying with ASTM C1002, Type S, hot dipped zinc coated steel, of sufficient length to penetrate steel framing.
 4. Sealing Tape: Manufacturers standard pressure sensitive seam sealing of tape of polyolefin film coated with a permanent acrylic adhesive.
 5. Joint Sealer:
 - a. Polyurethane or latex based joint sealer acceptable or recommended by sheet manufacturer and complying with Section 07 92 00.
 - b. If exposed to the interior of the building (i.e., inside of the weatherproofing system and applied on-site), provide materials in accordance with the low-emitting materials requirements of Section 01 60 00 - Materials and Equipment.
 6. Adhesive:
 - a. Polyurethane or latex based adhesive acceptable to sheet manufacturer.
 - b. If exposed to the interior of the building (i.e., inside of the weatherproofing system and applied on-site), provide materials in accordance with the low-emitting materials requirements of Section 01 60 00 - Materials and Equipment.

2.3 FURRING, LATHING AND ACCESSORIES

- A. General:
1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 2. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
- B. Wire Mesh Reinforcement: 2 inch x 2 inch galvanized steel, 24 gauge wire, woven mesh.
- C. Metal Lath: 2.5 lb./sq.yd. expanded metal, self-furring type lath complying with ASTM C847; fabricated from galvanized steel sheet complying with ASTM A653, G60.
- D. Corner Mesh: Formed steel, minimum 26 gauge; expanded flanges shaped to permit complete embedding in plaster; minimum 2 inches wide; galvanized finish.

- E. Corner Beads: Formed steel, minimum 26 gauge; beaded edge, of longest possible length; sized and profiled to suit application; galvanized finish.
- F. Base Screeds: Formed steel, minimum 26 gauge; square edge, of longest possible length; sized and profiled to suit application; galvanized finish.
- G. Casing Bead: Formed steel; minimum 26 gauge; thickness governed by plaster thickness; maximum possible lengths; expanded metal flanges, with square edges; galvanized finish.
- H. Control Joint Accessory: Formed steel; minimum 26 gauge; galvanized finish; accordion profile, 2 inch expanded metal flanges each side; galvanized finish.
- I. Expansion Joint Accessory: Formed steel, 26 gauge; accordion profile, 2 inch expanded metal flanges each side; galvanized finish.
- J. Flashing Reglets: As specified in Section 07 60 00.
- K. Tie wire shall be double annealed and galvanized conforming to Type I FS QQ-W-461, of gauges specified.
- L. Anchorages: Nails, staples, or other approved metal supports, of type and size to suit application, galvanized to rigidly secure lath and associated metal accessories in place.

2.4 PROPORTIONING AND MIXING

- A. Accurately measure ingredients. Proportion successive batches exactly alike. Mix aggregate, cement and other dry materials until the mass is uniform in color and homogeneous before adding water. Determine the quantity of water necessary for the desired consistency by trial, and thereafter measure in proper proportions. Re-tempering will not be allowed.
- B. Mortar for coats shall consist of one volume of portland cement to not less than three or more than five volumes of damp, loose aggregate.
- C. Hydrated lime, hydrated lime putty, or slaked lime putty may be added as a plasticizing agent, but the amount used shall not exceed 10 percent by weight nor more than 25 percent by volume of the cement used.
- D. Mix materials dry, to uniform color and consistency, before adding water.
- E. Mix integral color to provide consistent color for all batches.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Preconstruction Conference: A conference shall be held at the jobsite prior to start of construction of this portion of the work to review substrates, flashing conditions, work provided by preceding trades and work required by trades following this work. General Contractor, subcontractor(s) affected by the work of this section, Architect and Resident Engineer and Owner's Representative shall be in attendance. If required, modifications shall be made to details and to specifications to address actual field conditions.

- B. Gypsum Sheathing:
 1. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
 2. Verify that surface of framing members do not vary more than 1/4 inch from the plane of faces of adjacent members.
 3. Coordination: Coordinate with other work which affects, connects with, or will be concealed by this Work.

- C. Weather Resistive Barrier:
 1. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
 2. Verify base, sill and other flashing materials are in place prior to installation of weather resistive barrier.

- D. Portland Cement Plaster:
 1. Verification of Conditions: Examine subsurfaces and supports to receive Work and report detrimental conditions in writing, with a copy to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces. Verify, before proceeding with this Work that required inspections of existing conditions have been completed.
 2. Coordination with other Work: Coordinate with other Work which affects, connects with, or will be concealed by this Work. Before proceeding, make certain required inspections have been made.

3.2 SHEATHING INSTALLATION

- A. Gypsum Sheathing: In accordance with GA-253, ASTM C1280 and the manufacturer's recommendations and IBC requirements.
 1. Verify that surface of framing members do not vary from more than 1/4 inch from the plane of faces of adjacent members.
 2. Panels of the maximum length possible shall be used to minimize the number of joints. Edge joints must be located parallel to and with vertical orientations on framing. End joints of adjacent lengths of sheathing must be staggered.
 3. Cut board at penetrations, edges and other obstructions; and fit tightly against abutting construction, unless otherwise indicated.
 4. Fasteners must be driven so as to bear tight against and flush with surface of sheathing, but do not cut into facing. Fasteners must not be countersunk.
 5. Do not bridge building expansion joints with sheathing; cut and space edges to match spacing of structural support elements.
 6. Fasteners must be located a minimum of 3/8 inch from edges and ends of sheathing panels.

3.3 WEATHER-RESISTIVE BARRIER/LATHING FOR THIN BRICK VENEER

- A. Cover sheathing completely with weather-resistive barrier prior to lathing installation.
 1. Apply material horizontally starting at outside corner with bottom aligned with foundation or bottom termination and plumb. Leave 6 to 12 inches of material at corner for overlap. Align stud marks on rolls with framing members of exterior wall.
 2. Use material as required to span floor to floor height and lap upper layer over lower layer 6 inches minimum. Lap vertical joints 6 inches minimum.
 3. Secure sheet to foundation with continuous bead of joint sealer.

4. Wrap sheet 6 inches minimum around all corners lapped over adjacent sheet and taped.
 - a. Fasten to sheathed wood frame construction with staples, large head nails, or plastic washer nails.
 - b. Fasten to metal frame construction with steel drill screws with washers.
 - c. Attach to masonry surfaces with adhesive.
7. Lap upstanding flashing with 4 inch minimum overlap and secure with adhesive.
8. Tape all seams, window and door penetrations, corners, and torn or damaged areas as recommended by sheet manufacturer and as detailed on Drawings.
9. Completed installation shall be free of holes or breaks.

3.4 LATH AND TRIM INSTALLATION

- A. Install underlayment over wood framing and sheathing, and lap 2 inches minimum.
- B. Lathing: Comply with ML/SFA 920, and the following:
 1. Install lath with the long dimensions of the sheet across supports and attach to the studs or furring using 18 gauge tie wire, or by nailing or by equivalent attachment spaced at intervals not exceeding 6 inches along such studs or furring members. Make end laps of lath only over supports and stagger end laps in adjacent courses.
- C. Metal Trim, Joint Assemblies and Reveals: Securely fasten trim members to maintain their position in accordance with recommended practice.
 1. Install casing beads where stucco terminates against dissimilar materials.
 2. Install reveals and other trim at locations indicated on Drawings.
 3. Control and Expansion Joints: Locate and install control joints at locations indicated on Drawings, but not more than the maximum spacing and panel size recommendations of ASTM C1063 as approved by the Architect and Resident Engineer, and as follows:
 - a. Install control joints directly over any expansion or contraction joints in the surface of the underlying construction.
 - b. Install control joints directly over joint between changes in substrate materials.
 - c. Wall Area: Install control joints in walls to create wall areas of not more than 144 sq. ft. in area and not more than 100 sq. ft. for all ceilings, curves, or angular plaster surfaces.
 - d. Joint Spacing: Install control joints at maximum 18 ft spacing in either direction or a length-to-width ratio of 2-1/2 to 1.

3.5 STUCCO APPLICATION

- A. Application, General: Comply with ASTM C926, and the following.
- B. Apply scratch coat with sufficient pressure so that it is forced through the metal reinforcement and against the backing to form full keys and to embed reinforcement completely. Apply to an approximate thickness of 3/8 inch from the face of the backing. Scratch to provide bond for succeeding coat.
- C. Apply brown coat not sooner than 48 hours after the application of the scratch coat. Dampen scratch coat evenly to obtain uniform suction. Apply to an approximate thickness of 3/8 inch. Bring surface to a true, even surface by floating or rodding and leave rough, ready to receive finish coat.

- D. Concrete or Masonry Substrates: Apply brown coat directly over concrete or masonry, proportioned as specified above. Dampen surface evenly to obtain uniform suction. Apply to an approximate thickness of 3/8 inch. Bring surface to a true, even surface by floating or rodding, leave rough ready to receive finish coat. Cure for 7 days by keeping moist.
- E. Apply finish coat not sooner than 14 days after the application of the preceding coat. Before applying, dampen the surface of the preceding coat evenly to obtain uniform suction. Thickness of the finish coat shall be sufficient to secure the texture specified but in no case less than 1/8 inch and the total thickness of the stucco shall be at least 7/8 inch from the face of the backing. Avoid excessive troweling.
- F. When applying the finish, plan Work so entire wall can be completed at one time to eliminate joining marks. If not practical, use a corner, door or window as a breaking point.
- G. Finish Coat Texture: Smooth.
- H. Temperature shall be 45 degrees F. and rising during application and for 48 hours thereafter.
- I. Curing: Keep each coat of stucco damp for at least 48 hours after application; moistening of each coat shall begin as soon as the stucco has hardened sufficiently so as not to be injured. Apply water in a fine fog spray. Avoid soaking the wall. Apply only as much water as can be readily absorbed.

3.6 REPAIRS

- A. Remove and replace stucco which has cracks, blisters, pitting, discoloration or other defects.
- B. Repairing of defects will be permitted only when approved by the Architect and Resident Engineer.
- C. Repairs shall match existing Work.

3.7 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.

END OF SECTION

SECTION 09 28 16
GLAS ROC TILE BACKER

Part 1 — General

- 1.1 RELATED DOCUMENTS
- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1. Specification Sections, apply to this Section.
- 1.2 SUMMARY
- A. This Section includes the following:
1. Moisture-resistant Embedded Glass Reinforced Gypsum™ (EGRG™) Tile Backer.
- 1.3 REFERENCES
- A. ASTM C 473: Standard Test Methods for Physical Testing of Gypsum Panel Products
- B. ASTM C 840: Standard Specification for the Application and Finishing of Gypsum Board
- C. ASTM C 954: Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in (0.84 mm) to .112 in (2.84 mm) in Thickness
- D. ASTM C 1002: Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
- E. ASTM C 1178: Standard Specification for Glass Mat Water-Resistant Gypsum Backing Panel
- F. ASTM D 3273: Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
- G. ASTM E 96: Standard Test Methods for Water Vapor Transmission of Materials
- H. ASTM E 119: Standard Test Methods for Fire Tests of Building Construction and Materials
- I. Tile Council of North America: TCA Handbook for Ceramic Tile Installation
- J. ANSI: American National Standard Specifications for the Installation of Ceramic Tile
- K. Gypsum Association: GA-216
- L. Gypsum Association: GA-214
- 1.4 SUBMITTALS
- A. Submit in accordance with Section 01 33 00.
- B. Product Data: For each type of product indicated.
- C. Informational Submittals: Submit manufacturer's instructions, special procedures, and perimeter conditions requiring special attention.
- 1.5 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 (UL 263, CAN/ULC-S101) by a testing and inspecting agency acceptable to authorities having jurisdiction.
1. Fire-Resistance Ratings: Indicated by design designations from ULI and ULC "Fire Resistance Directory" and Products Certified for Canada.
- B. Single Source Responsibility: Except where specified otherwise, obtain gypsum board products, joint treatment, and accessories from single manufacturer or from manufacturers recommended by prime manufacturer of gypsum board products.

- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Store materials protected against damage from weather, direct sunlight, surface contamination, construction traffic, or other causes. Stack CertainTeed Diamondback™ GlasRoc® Tile Backer flat on leveled supports off the ground, under cover, and fully protected from weather.
 - 1. Store and support CertainTeed Diamondback™ GlasRoc® Tile Backer board in flat stacks to prevent sagging.
 - 2. Protect materials to keep them dry.
 - 3. Protect gypsum board panels to prevent damage to edges, ends, and surfaces.

Part 2 — Product

- 2.1 GLASS MAT GYPSUM TILE BACKER
- A. Fully embedded glass mat gypsum tile backer meeting the requirements of ASTM C 1178.
 - 1. CertainTeed Gypsum, Inc.
 - a. Basis of Design: "Diamondback™ GlasRoc® Tile Backer" with EGRG™ technology
 - b. Substitutions: Submit in accordance with Section 01 60 00.
 - 2. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick where indicated and as otherwise required to meet fire rating for specific element. [1/2 inch (12.7 mm) elsewhere.]
 - a. Flame spread: ASTM E 84: Class A.
 - b. Smoke developed: ASTM E 84: Class A.
 - 3. Standard Size: 4 feet by 8 feet (1219 by 2438 mm).
- 2.2 GLASS MAT GYPSUM TILE BACKER JOINT TREATMENT MATERIALS
- A. Glass-Fiber Mesh Tape: Alkali-resistant self-adhering glass-fiber tape, minimum 2 inches (50mm) wide, 10 by 10 or 10 by 20 threads/inch (390 by 390 or 390 by 780 threads/m).
- 2.3 ACCESSORY MATERIALS
- A. Fasteners: Steel drill screws or nails, in lengths recommended by tile backer manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating.
 - 1. For steel framing less than 0.0329 inch (0.835 mm) thick, attach tile backer with corrosion-resistant backer board screws complying with ASTM C 1002.
 - 2. For steel framing from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick, attach tile backer with drill screws complying with ASTM C 954.
 - 3. For wood framing, attach with galvanized roofing nails or corrosion resistant backer board screws of type and spacing as recommended by tile backer manufacturer.

Part 3 — Execution

- 3.1 GLASS MAT GYPSUM TILE BACKER INSTALLATION
- A. Comply with GA-216, ASTM C 840, TCA Handbook for Ceramic Tile Installation and manufacturer's written instructions.
 - B. Install CertainTeed Diamondback™ GlasRoc® Tile Backer with diamond textured side facing inwards to receive tile.
 - C. Cut boards at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.
 - 1. Install boards with a 1/4 inch (6 mm) setback where they abut bathtub or shower receptors to prevent wicking.
 - 2. Allow no joints greater than 1/8 inch (3 mm).

- D. Apply fasteners so screw heads bear tightly against gray acrylic coated face of tile backer boards; do not countersink fasteners.
- E. Do not install an additional vapor barrier in conjunction with tile backer boards.
- F. Space wall framing members a maximum of [16 inches (400 mm) o.c. for 1/2" tile backer] [24 inches (600 mm) o.c. for 5/8" tile backer]
- G. Horizontal Installation: Install tile backer with long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of stud flanges, and stagger end joints of adjacent boards not less than one stud spacing. Screw-attach boards at perimeter and within field of board to each steel stud.
 - 1. Space fasteners approximately 6 inches (150 mm) o.c. (or tighter spacing if recommended by manufacturer for specific application) and set back a minimum of 3/8 inch (10 mm) from edges and ends of boards.
- H. Limitations
 - 1. Not for exterior use.
 - 2. Do not use as a base for nailing and mechanical fastening.
 - 3. Do not install on shower floors or in shower curbs.

3.2 TILE BACKER JOINT TREATMENT

- A. Seal tile backer joints, as required, according to tile backer manufacturer's written recommendations.
 - 1. Apply bead of sealant in 1/4 inch (6 mm) setback between tile backer boards and tub or shower receptor.
 - 2. Apply alkali-resistant glass-fiber mesh tape to tile backer board joints, apply and trowel latex-modified thin set mortar in entire face of tape.

3.3 CEILINGS

- A. Application of tile backer boards to ceiling requires the following:
 - 1. Space framing members a maximum of [12 inches (300 mm) o.c. for 1/2 inch (12.7 mm)] [16 inches (400 mm) o.c. for 5/8 inch (15.9 mm)] tile backerboards.

SAFETY:

For more information, consult the Material Safety Data Sheet by contacting CertainTeed at 1-800-233-8990 or email: building.solutions@certainteed.com. For an electronic copy of this specification, please visit: www.certainteed.com

SECTION 09 29 00

GYPSUM BOARD

PART 1 GENERAL

1.1 SUBMITTALS

- A. Product Data: Submit data on gypsum board, joint, finish and accessories.
- B. Samples: Submit sample of textured finish prior to application.
- C. Reports: Submit fire test report for fire rated assemblies, and acoustical performance test reports for acoustically-rated assemblies.
- D. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.2 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in Gypsum Board Systems Work with 2 years documented experience and approved by Manufacturer.
- B. Regulatory Requirements: Conform to applicable code for fire rated assemblies as shown on the Drawings.
- C. Comply with applicable specification recommendations of GA-216 and GA-600 as published by the Gypsum Association.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Comply with GA-216 and Manufacturer's directions.

1.4 PROJECT CONDITIONS

- A. Physical Requirements for Proper Installation or Application:
 - 1. Maintain temperature of installed gypsum board spaces in range of 55 degrees F. to 90 degrees F. until building is entirely closed.
 - 2. Ventilate as required to eliminate excessive moisture.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Furnish products of one of the following Manufacturers, except as approved by the Architect and Resident Engineer, subject to compliance with Specification requirements:
 - 1. G-P Gypsum www.gp.com/gypsum/
 - 2. Gold Bond Building Products Div., National Gypsum Co. www.nationalgypsum.com
 - 3. United States Gypsum Co. www.usg.com
 - 4. BPB Gypsum (formerly James Hardie Gypsum) www.us.bpb-na.com
 - 5. Pabco Gypsum www.pabco gypsum.com
 - 6. Or equal.

2.2 MATERIALS AND ACCESSORIES - GENERAL

- A. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 - 1. Paper: 100% post-consumer recycled content
 - 2. Synthetic gypsum: Gypsum board to be made with flue-gas-desulfurization (synthetic) gypsum if such a product is available locally
- B. Provide regional materials in accordance with Regional Materials provisions of Section 01 60 00.

2.3 GYPSUM BOARD MATERIALS

- A. Fire Rated Gypsum Board:
 - 1. Toilet room walls and apparatus room walls (for painted wall finish): USG Fiberock, thickness as indicated on Drawings, in accordance with UL Design U419, or approved equal.
 - 2. Other locations: ANSI/ASTM C36 or ASTM C1396; fire resistive type, UL rated; 5/8 inch, maximum permissible length; ends square cut, tapered edges.
- B. Moisture Resistant Gypsum Board: ANSI/ASTM C630 or ASTM C1396; 5/8 inch thick, maximum permissible length; ends square cut above tile wainscot in toilet rooms for painted finish.
- C. Exterior Gypsum Sheathing Board:
 - 1. As exterior sheathing: In accordance with Sections 04 21 33 – Thin Brick Veneer, 07 42 43.13 - Solid Composite Exterior Wall Panel Systems and 09 24 00 – Portland Cement Plaster (Stucco).
 - 2. As exterior soffit panel: In accordance with Section 09 29 13 – Exterior Soffit Panels.
- D. Cementitious Backer Units (Ceramic Tile Backer Board): Provide cementitious backer units conforming to ANSI A118.9. Georgia-Pacific Dens-Shield, Modulars Inc. Wonder-Board, or USG Durabond Division Durock Tile Backer Board are acceptable products. Furnish with joint tape.

2.4 ACCESSORIES

- A. Adhesive:
 - 1. ASTM C557.
 - 2. In accordance with the low-emitting materials requirements of Section 01 60 00 – Product Requirements.
- B. Acoustical Sealant: In accordance with Section 07 92 20 – Acoustical Sealant.
- C. Corner Beads: GA216; Type CB; electro-galvanized steel.
- D. Edge Trim: GA216; Type L bead; electro-galvanized steel and Type LC rolled-formed zinc.
- E. Control Joint: U.S. Gypsum No. 093, roll-formed zinc.
- F. Joint Materials: ANSI/ASTM C475; reinforcing tape, joint compound, adhesive, water, and fasteners. For coated board and gypsum sheathing, use material recommended by Board Manufacturer.

- G. Screws: ASTM C1002 for steel drill screws. Type G for fastening to gypsum board, Type S for fastening to light gauge steel framing and Type W for fastening to wood framing.
- H. Wall Texture: As manufactured by USG or equal, multi-purpose, pre-packaged, non-asbestos type.
- I. Drywall Primer:
 - 1. Paint material specifically formulated to fill the pores and equalize the suction difference between gypsum board surface paper and the compound used on finished joints, angles, fastener heads and accessories and over skim coatings.
 - 2. Drywall primer which is applied to the finished surface of the work specified in this section shall be provided as specified under Section 09 91 00 as applicable.
 - 3. A good quality, white latex drywall primer formulated with high binder solids, applied undiluted, shall be applied to gypsum board surfaces prior to the application of texture materials.
 - 4. In accordance with the low-emitting materials requirements of Section 01 60 00 – Product Requirements.
- J. Putty Pads: Acoustical Molding Seal at gypsum board at J-Boxes.

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that site conditions are ready to receive Work and opening dimensions are as instructed by the Manufacturer.
- B. Beginning of installation means acceptance of substrate.

3.2 GYPSUM BOARD INSTALLATION

- A. Install gypsum board in accordance with GA-201 and GA-216, and Manufacturer's instructions as applicable.
- B. Erect single layer standard gypsum board in most economical direction, with ends and edges occurring over firm bearing.
- C. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing.
- D. Ceiling Boards:
 - 1. Install gypsum panels prior to wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
 - 2. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- E. Use screws when fastening gypsum board to metal and wood furring or framing.

- F. Double Layer Applications:
 1. Use gypsum backing board for first layer, placed perpendicular to framing or furring members.
 2. Use fire rated gypsum backing board for fire rated partitions.
 3. Place second layer perpendicular to first layer.
 4. Offset joints of second layer from joints of first layer.
 5. Secure second layer to first with adhesive and sufficient support to hold in place. Apply adhesive in accordance with Manufacturer's instructions.
- G. Treat cut edges and holes in moisture resistant gypsum board with sealant.
- H. Place control joints consistent with lines of building spaces as indicated on Drawings and as recommended by Board Manufacturer.
- I. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.

3.3 JOINT TREATMENT

- A. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
- B. Feather coats onto adjoining surfaces so that camber is maximum 1/32 inch.
- C. Taping, filling, and sanding is not required at surfaces behind ceramic tile.

3.4 ACOUSTICAL TREATMENT

- A. Install acoustical sealant in accordance with Manufacturer's instructions and in accordance with Section 07 92 20.
- B. Install acoustical sealant at gypsum board perimeter at:
 1. Metal framing: Two beads.
 2. Base layer of double layer applications, if applicable.
 3. Face layer.
 4. Caulk partition penetrations by conduit, pipe, ductwork, and rough-in boxes.
- C. Install acoustical sealant where gypsum board joins other walls or surfaces at sound control partitions.
- D. Install putty pads at all J-Boxes wall cavities prior to installation of final gypsum board surfacing.

3.5 FINISHING OF GYPSUM BOARD SURFACES

- A. Provide finish of gypsum board surfaces in accordance with the Gypsum Association "Recommended Specification: Levels of Gypsum Board Finish" as follows:
 1. Level 0 (Temporary Construction): No taping, finishing, or accessories required.
 2. Level 1 (Fire Taping at plenum areas above ceiling, in attics, in areas where the assembly will be concealed or in building service corridors and other areas not normally open to public view):
 - a. Joints and interior angles shall have tape embedded in joint compound.
 - b. Surface shall be free of excess joint compound.
 - c. Tool marks and ridges are acceptable.
 3. Level 2: Not applicable.

4. Level 3 (Appearance areas to receive heavy or medium texture (spray or hand applied) finishes before final painting, or where heavy grade wallcoverings are to be applied as final decoration. This level of finish is not to be used where smooth painted surface or light to medium wallcoverings are to be applied.):
 - a. Joints and interior angles shall have tape embedded in joint compound and one additional coat of joint compound applied over joints and interior angles.
 - b. Fastener heads and accessories shall be covered with 2 separate coats of joint compound.
 - c. Joint compound shall be smooth and free of tool marks and ridges.
 - d. Surface to be coated with Drywall Primer as specified herein prior to application of texture.
 - e. Untextured surfaces to be coated with Drywall Primer prior to application of final finishes as specified in Section 09 91 00, as applicable.
 5. Level 4 (To be provided at locations as scheduled on Drawings):
 - a. Joints and interior angles shall have tape embedded in joint compound and 2 separate coats of joint compound applied over flat joints and one separate coat of joint compound applied over interior angles.
 - b. Fastener heads and accessories shall be covered with 3 separate coats of joint compound.
 - c. Joint compound shall be smooth and free of tool marks and ridges.
 - d. Surface to be coated with Drywall Primer as specified herein prior to application of texture.
 - e. Untextured surfaces to be coated with Drywall Primer prior to application of final finishes as specified in Section 09 91 00, as applicable.
 6. Level 5 (To be provided at Public Areas as scheduled on Drawings):
 - a. Joints and interior angles shall have tape embedded in joint compound and 2 separate coats of joint compound applied over flat joints and one separate coat applied over interior angles.
 - b. Fastener heads and accessories shall be covered with 3 separate coats of joint compound.
 - c. A thin skim coat of joint compound, or a material manufactured especially for this purpose, shall be applied to the entire surface to fill imperfections in the joint work, smooth the paper texture and provide a uniform surface for decorating. Excess compound shall be immediately sheared off, leaving a film of skim coating compound completely covering the paper.
 - d. The surface shall be smooth and free of tool marks and ridges.
 - e. Surface to be coated with Drywall Primer as specified herein prior to application of texture.
 - f. Untextured surfaces to be coated with Drywall Primer prior to application of final finishes as specified in Section 09 91 00, as applicable.
- B. Surfaces shall be free of dust, dirt and oil and shall received Drywall Primer before application of texture or skim coat as required by the manufacturer of the texture or skim coat materials.
 - C. Surface Finish: Produce smooth surface finish to match approved sample.
 - D. Stagger joints of gypsum board on opposite sides of walls at dorm rooms and toilet rooms so as to minimize unwanted sound transfer for minimum STCratings.

3.6 CLEANING

- A. After completion of wallboard installation, taping and texturing, remove rubbish, excess material and equipment from building and job site, leaving floors and other surfaces clean.
- B. Remove overspray from adjoining construction.
- C. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of away from premises. Leave Work in clean condition.
- D. Construction Waste: In accordance with Section 01 74 19.
- E. Water Pollution Control: In accordance with Greenbook/Whitebook requirements.
- F. Storm Water Control: In accordance with Greenbook/Whitebook requirements, Section 7-8.6.
- G. Environment Protection: In accordance with Greenbook/Whitebook requirements, Section 7-8.6.

3.7 PROTECTION

- A. Protect Work from damage until acceptance.
- B. Repair or replace damaged Work.

END OF SECTION

SECTION 09 29 13

EXTERIOR SOFFIT PANELS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Water-resistant gypsum sheathing for exterior soffit panel as shown on Drawings and as specified herein.
- B. Related Sections:
 - 1. Section 09 24 00 – Portland Cement Plaster (Stucco): Stucco over fiberglass faced gypsum sheathing panels.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications, design data and installation instructions.
- B. Contract Closeout Submittals: Submit Manufacturer's standard warranty in accordance with Section 01 77 00 - Closeout Procedures and as specified herein.
- C. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 QUALITY ASSURANCE

- A. Comply with applicable specification recommendations of GA-216 and GA-600 as published by the Gypsum Association.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in manufacturer's original unopened packaging with labels intact.
- B. Storage: Store panels flat in an enclosed shelter providing protection from damage and exposure to the elements.

1.5 WARRANTY

- A. Furnish Manufacturer's standard 10 year limited warranty covering defects in manufacturing and materials and minimum 6 month exposure warranty stating that product will remain free of defects and suitable for its intended use after installation, but before the exterior weather-resistive barrier or cladding is installed on the building, regardless of exposure to normal weather conditions.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 - 1. Paper: 100% post-consumer recycled content
 - 2. Synthetic gypsum: Gypsum board to be made with flue-gas-desulfurization (synthetic) gypsum if such a product is available locally
- B. Provide regional materials in accordance with Regional Materials provisions of Section 01 60 00.
- C. Glass Matt Exterior Sheathing Board: Dens-Glass Sheathing complying with ASTM C1177 as manufactured by G-P Gypsum Corporation.
 - 1. Thickness: 5/8 inch.
 - 2. Acceptable alternative manufacturers and products:
 - a. CertainTeed GlasRoc
 - b. US Gypsum SecurRock
 - c. Temple-Inland Greenglass
 - d. Or equal.

2.2 ACCESSORIES

- A. Fasteners: Type S-12, bugle head, self-tapping, with organic-polymer or other protective coating, fine thread for heavy gauge steel (12 to 22), or steel type Exterior Screws as manufactured by USG or equal.
 - 1. Length: As recommended to penetrate metal framing minimum depth as recommended by sheathing manufacturer.
 - 2. Additional requirements for Fasteners used for exterior gypsum sheathing at Exterior Insulation Finish (EIFS):
 - a. Corrosion resistant, with anti-corrosive coating capable of withstanding no more than 5 percent red rust after 500 hours of Salt Spray Tests in accordance with ASTM B117.
 - b. Size and type as used in wind load tests
- B. Reveal Molding: Fry Reglet Veneer Plaster "F" Reveal Molding or equal, sizes as indicated on Drawings with "Snap-in" Reveal (width as applicable to reveal width shown), 6063-T5 extruded aluminum alloy with clear anodized finish.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Verify that surface of framing members do not vary more than 1/4 inch from the plane of faces of adjacent members.
- C. Coordination: Coordinate with other work which affects, connects with, or will be concealed by this Work.

3.2 INSTALLATION

- A. Glass Matt Exterior Sheathing Board:
1. Install in accordance with manufacturer's printed instructions. Yellow side of sheathing shall face to the exterior with the white face facing the interior of the building.
 2. Verify that surface of framing members do not vary from more than 1/4 inch from the plane of faces of adjacent members.
 3. End joints shall be offset. Joints should fit snugly and flashing installed around openings.
 4. Panels of the maximum length possible shall be used to minimize the number of joints. Edge joints must be located parallel to and with vertical orientations on framing. End joints of adjacent lengths of sheathing must be staggered.
 5. Attach sheathing to metal framing with screws spaced 8 inches o.c. at perimeter and 8 inches o.c. in field, unless otherwise required to meet wind load requirements.
 6. Fasteners must be driven so as to bear tight against and flush with surface of sheathing. Fasteners must not be countersunk.
 7. Fasteners must be located a minimum of 3/8 inch from edges and ends of sheathing panels.
 8. Sealing Sheathing Joints: Seal joints according to sheathing manufacturer's written recommendations and as follows:
 - a. Apply 2-inch self-adhering glass-fiber sheathing tape to glass-mat gypsum sheathing board joints overlapping at intersections by width of tape.
 - b. Apply 3/8 inch bead of silicone emulsion sealant along the joint and trowel embed sealant into entire face of tape.
 - c. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.
 9. Where a smooth finished surface is indicated, apply joint tape over joints and embed in setting type joint compound. Skim coat entire surface with setting type joint compound for smooth finish.
 10. Provide reveal moldings where indicated on Drawings.

3.3 CLEANING

- A. During the course of the Work and on completion of the Work, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

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SECTION 09 30 00

TILE

PART 1 GENERAL

1.1 SUBMITTALS

- A. Product Data: Submit Manufacturer's data for tile and accessory materials, including the following
 1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Recommended procedures for mixing materials and setting tile.
- B. Samples: Submit samples of each type of ceramic tile required, marked with Manufacturer's name and location where tile is to be installed.
- C. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.2 QUALITY ASSURANCE

- A. Comply with applicable requirements of ANSI A-108 Series and the TCA "Handbook for Ceramic Tile Installation." Tile shall bear the TCA grade seal. In addition, comply with applicable requirements of the Technical Field Reports and other documentation as provided by the Ceramic Tile Institute (CTI).
- B. Manufacturer Qualifications: Company specializing in manufacturing the products of this section with minimum two years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum two years documented experience.
- D. Pre-Installation Meeting: Prior to commencing the work of this Section, schedule and attend a meeting at the job site to discuss conformance with Project requirements. Conduct Pre installation conference at project site to view existing concrete slab prior to installation of leveling compound, mortar, or crack isolation membrane. Notify 72 hours in advance and Include manufacturers product rep, subcontractor, general contractor, owner rep, Architect and Resident Engineer. Do not install products on unsatisfactory substrate.
- F. Mock-ups: Provide job site mock-ups which will be used as data for comparison with the remainder of the work of this Section for the purposes of acceptance or rejection. Mockup shall allow evaluation of surface preparation techniques and application workmanship if required by Architect and Resident Engineer.
 1. Locate mock-ups on site in locations and size directed by Architect and Resident Engineer.
 2. Finish areas designated by Architect and Resident Engineer.
 3. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect and Resident Engineer.
 4. Refinish mock-up area as required to produce acceptable work.
 5. Retain and maintain mock-ups during construction in undisturbed condition as a standard for judging completed unit of Work.

6. Obtain Architect's and Resident Engineer's acceptance of mock-ups before start of final unit of Work.
- G. Blending:
 1. Tile manufacturer to blend tile at the factory.
 2. Provide additional blending at the job site as needed to obtain the Architect's and Resident Engineer's approval.
- H. Regulatory Requirements: Provide floor tiles with coefficient of friction in accordance with ADA guidelines.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Deliver manufactured materials in original, unbroken containers bearing name of Manufacturer, brand and grade seals. Keep materials dry, clean and protected against deterioration. Comply with requirements of ANSI A137.1 for labeling sealed tile packages.
- B. Prevent damage or contamination to materials by water, freezing, foreign matter and other causes.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.4 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.
- B. Environmental: Install mortar, set and grout tile when surfaces and ambient temperature is minimum 50 degrees F (10 degrees C) and maximum 90 degrees F (32 degrees C). Consult with manufacturer for specific requirements.
- C. Protection: Protect adjacent work surfaces during tile work. Close rooms or spaces to traffic of all types until mortar and grout has set.

1.5 WARRANTY

- A. Products shall be provided with the manufacturers standard warranty as follows:
 1. Installation Systems Limited Warranty: Fifteen (15) Year Warranty.

1.6 MAINTENANCE

- A. Extra Materials: Furnish one (1) square foot of tile for each 100 square feet of each color and size of tile and grouting materials used in the Project. If less than 100 square feet is installed, provide a minimum of one square foot of extra stock. Extra materials shall be furnished in original packaging.

PART 2 PRODUCTS

2.1 MATERIALS AND ACCESSORIES - GENERAL

- A. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
- B. Provide regional materials in accordance with Regional Materials provisions of Section 01 60 00.

2.2 TILE MATERIALS

- A. General: See Finish Schedule as released by Architect and Resident Engineer for bidding purposes
- B. Porcelain Tile Floor: CT1-Daltile, 12"x24" P'Zazz, P264 Golden Glamor (or equal approved by Architect).
CT2-Daltile 12"x12" P'Zazz P264 Golden Glamor (or equal approved by Architect)
- C. Ceramic Tile:
CT4-Daltile 6"x6", Luminary Gold 0142 Semi-Gloss Field Tile at wall. 6"x6" Bullnose at top of wainscot and above shower (or equal approved by Architect).
CT5-Daltile, 6"x6", Crisp Linen 0739 Matte Accent Tile at showers (or equal approved by Architect)

2.3 INSTALLATION MATERIALS

- A. Skim Coat and Patching Underlayments: Where indicated on the drawings, and elsewhere as required to existing mortar bed providing a flat, level surface for direct receipt of tile and other floor coverings on dry, interior installations.
 - 1. Custom Building Products Skim Coat and Patching Cement Underlayment or equal for fills up to 1/2 inch (12.5 mm) thick.
 - 2. Custom Building Products LevelQuik Rapid Setting Self-Leveling Underlayment or equal for fills up to 1 inch (25 mm) thick.
 - a. Custom LevelQuick Latex Primer or equal; Prepares surfaces for LevelQuik Rapid Setting Self-Leveling Underlayment.
- B. Anti-Fracture Membrane/Cleavage Membrane: Where indicated on the drawings, and elsewhere as required for isolating the installation from cracking due to minor substrate movement and normal structural deflections.
 - 1. Custom Building Products Crack Buster Pro Crack Prevention Mat Underlayment or equal
 - a. Custom Peel & Stick Primer or equal; Prepares surfaces for peel & stick adhesive underlayment.
- C. Cementitious Tile Adhesives: ANSI A118.4: Polymer-Enhanced Mortars:
 - 1. Tile adhesive requires a minimum "Shear Bond" strength after 28 days of 450 PSI for bisque tile and 600 PSI for porcelain tile. .
 - 2. Custom Building Products ProLite Thin Set and Medium Bed Mortar or equal.

- D. Cement Based Grout: Where indicated on the drawings, and elsewhere as required for filling the joints between tiles.
1. Polymer-Modified Portland Cement Grout:
 2. Tile grout requires a minimum "Tensile Strength" after 28 days of 500 PSI.
 3. Acceptable Product: Custom Building Products Prism SureColor Tile Grout or equal, ANSI A118.7 for joints 1/8 inch (3 mm) to 1/2 inch (13mm).
 4. Grout Sealer: As recommended by grout manufacturer.

2.5 ACCESSORIES

- A. Ceramic Tile Backer Board: As specified in Section 09 29 00. Furnish with jointtape.
- B. Expansion/Control Joint Backing Material: Provide closed cell polyethylene foam weighing not less than 2.7 lbs. per cubic feet, and in dimension approximately 20 percent thicker than width of the expansion joint in which used.
- C. Expansion/Control Joint Sealant: Provide in colors selected by the Architect and Resident Engineer, complying with requirements of Section 07 92 00.
1. At joints between floors and walls, and at perimeter of metal door frames, provide one-part low modulus moisture cure silicone rubber sealant conforming to FS TT-S-001543A, Class A, FS TT-S-00230C, Type II, Class A and ASTM C 920, Type S, Grade NS, Class 25, Use NT, M, G, A, and O.
 2. At joints in traffic areas, and at perimeter joints, provide two-part polyurethane material conforming to ASTM C920, Type M, Grade P, Class 25, Use T, with Shore A hardness of 35 - 45 .
 3. Sealants shall be in accordance with the low-emitting materials requirements of Section 01 60 0 – Product Requirements.
- D. Waterproof Membrane (2nd and 3rd floor toilet and shower rooms): Provide one of the following:
1. PRP 315 two-component synthetic polymer anti-fracture and waterproofing membrane and as manufactured by Mapei Corporation or equal, meeting ANSI A118.10, trowel-applied
 2. Schluter KERDI sheet waterproofing membrane or equal.
 3. Other sheet waterproofing membrane meeting Uniform Plumbing Code and so labeled and acceptable to Architect and Resident Engineer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine subsurfaces to receive Work and report detrimental conditions in writing. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordinate with other Work which affects, connects with or is concealed by this Work. Before proceeding, make certain required inspections have been made.
- C. Where tile units will be thin-set directly to the substrata, do not commence installation of the tile units until substrata are within the following tolerances:
1. Horizontal surfaces: Level within 1/8 inch in ten feet in all directions;
 2. Vertical surfaces: Level within 1/8 inch in eight feet in all directions.

3. Deflection:
 - a. Horizontal Surfaces: Less than $1/360$ of the span.
 - b. Vertical Surfaces: Verify that design of the wall or partition will not permit deflection exceeding $1/360$ of the span for point and uniform loading. Space wood or metal studs not less than 16 inches on centers.

- D. Conditions of Surfaces to Receive Tile:
 1. Verify that surfaces to receive tile are firm, dry clean, and free from oily or waxy films and curing compounds.
 2. Verify that grounds, anchors, plugs, recess frames, bucks, electrical work, mechanical work, and similar items in or behind the tile have been installed before proceeding with installation of tile.
 3. Scarify hard steel trowel finish concrete surfaces.
 4. Completely remove curing compounds on concrete surfaces by scarification or cleaning methods acceptable to tile setting materials manufacturer.

3.2 PREPARATION

- A. Lay out Work so that no tile of less than half size occurs.
 1. For heights stated in feet and inches, maintain full courses to produce nearest attainable heights without cutting tile.
 2. Align joints in wall tile vertically and horizontally except where other patterns are shown or specified. Align joints in walls to conform to patterns selected.
 3. Align joints in floor tile at right angles to each other and straight with walls and conform to patterns selected or indicated.

- B. Obtain exact locations of expansion joints and accessories before installing tile. Locate accessories in tile walls as indicated on Drawings or as directed by Architect and Resident Engineer. Where the size of accessory does not line up with the jointing pattern of adjacent tile, the cutting of tile and arrangement of joints around the accessories shall be as directed by Architect and Resident Engineer.

- C. Surface Preparation for Tile Work.
 1. General:
 - a. All supporting surfaces shall be structurally sound, solid, stable, level, plumb, and true to a tolerance in plane of $1/4$ inch (6 mm) in 10 feet 0 inch (3 m) for walls, $1/4$ inch (6 mm) in 10 feet (3 m) for floors when specified for thin-set method. They shall be clean and free of dust, oil, grease paint, tar, wax, curing compound, primer, sealer, form release agent, laitance, loosely bonded topping, loose particles or any deleterious substance and debris which may prevent or reduce adhesion.
 - b. Mechanically sand and scarify the substrate to completely remove all paint, loosely bonded topping, loose particles and construction debris.
 - c. Neutralize any trace of strong acid or alkali.
 - d. All substrates shall be dry. The moisture content shall not exceed 50 percent.
 - e. Turn off all forced ventilation and radiant heating systems and protect work against drafts during installation and for a period of at least 72 hours after completion. Use indirect auxiliary heaters to maintain the temperatures in the area at the recommended workable level. Vent temporary heater to exterior to prevent damage to tile work from carbon dioxide build-up.

- f. Presswood, particleboard, chipboard, masonite, gypsum floor patching compounds, asbestos board, Luan and similar dimensionally unstable materials are not acceptable substrates. Before work commences examine the areas to be covered and report any flaw or adverse condition in writing to the Architect and Resident Engineer and to the general contractor. Do not proceed with work until surfaces and conditions comply with the requirements indicated in ANSI A108 specifications.
2. Concrete:
- a. All concrete substrates shall be at least 28 days old, completely cured and free of hydrostatic conditions, and/or moisture problems.
 - b. New concrete surfaces for dry-set mortar, medium-bed mortar or thick-bed mortar installations shall be wood floated or broom finished. Concrete walls should be bush-hammered or heavily sandblasted.
 - c. On grade or below grade concrete slabs must be installed over an effective vapor barrier and be exempt from hydrostatic pressures.
 - d. Over excessively dry porous concrete, keep the concrete substrate continuously moist for at least 24 hours before work begins when using dry-set mortars or medium-bed mortars. Remove all excess water or standing water allowing the surface to become almost dry before installing the leveling coat, dry-set mortar or medium-bed dry-set mortar.
 - e. For minor repairs and smoothing up to 1/2 inch (12 mm), use Skim Coat & Patch Cement Underlayment or SpeedFinish Patching & Finishing Compound.
 - f. For leveling of large areas use LevelLite Self-Leveling Underlayment for pours up to 2 inches (51 mm) thick, LevelQuik Rapid Setting Self-Leveling Underlayment for pours up to 1 inch (25 mm) thick or Extended Setting Self-Leveling Underlayment for pours up to 1 inch (25 mm) thick.

3.3 INSTALLATION

- A. Ceramic Tile Backer Board: Install full height (including ceramic tile wainscot locations) at restroom and apparatus walls indicated on Drawings in accordance with Manufacturer's directions and as specified in Section 09 29 00.
- B. Skim Coat and Patching Underlayment:
 - 1. Dampen existing mortar bed.
 - 2. Force material into all cracks and voids up to 1/2" (13 mm) thickness using a broad knife or trowel and finish flush with surface.
 - 3. For skim coating, use a smooth edged trowel to level the surface area. Only spot patching should be done on wood surfaces.
 - 4. If a leveling layer over 5 ft. (1.5 m) in diameter is required, use the LevelQuik Self-Leveling Underlayment.
- C. Anti-Fracture Membrane Application:
 - 1. Apply with a paint brush or short nap roller. Apply a thin, even coat and allow to dry to a clear film before applying anti-fracture membrane.
 - 2. With the release sheet still attached, pre-measure and cut membrane to desired length. Membrane should extend 6" to 8" (15 – 20 cm) beyond the length of the crack in both directions and extend beyond both sides of the crack a minimum of the diagonal measurement of the tile.
 - 3. Re-roll membrane and center over the crack. Remove about 2" (5 cm) of release paper and apply firmly to the substrate. Pull off the rest of the release paper exposing and unrolling the self-stick portion of the membrane.
 - 4. Secure membrane to the substrate by rolling with a 50 lb. (26 kg) roller or 50 lb. of heavy pressure from a hand roller or flat trowel.

- D. Setting Materials:
1. Specified setting materials may be installed up to 3/4 of an inch thick on horizontal surfaces.
 2. Apply mortar or adhesive with notched trowel using scraping motion to work material into good contact with the wall surface to be covered. Maintain 95 percent coverage on back of Tile and fully bed all corners.
 3. When installing natural stone Tiles, trowel a sufficient quantity of mortar adhesive onto back of each Tile.
 4. Maintain 95 percent coverage on back of the Tile and fully bed all corners.
 5. Apply only as much mortar or adhesive as can be covered within allowable windows as recommended by mortar or adhesive manufacturer or while surface is still tacky.
 6. Set Tiles in place and rub or beat with small beating block.
 7. Lightly beat or rap Tile to ensure proper bond and also to level surface of Tile.
 8. The setting materials must be free of voids to create a continuous, solid bond.
 9. Align Tile to show uniform joints and allow for setting until firm.
 10. Clean excess mortar or adhesive from surface of Tile with wet cheesecloth while mortar is fresh.
- E. Tile: The current edition of the "TCNA Handbook for Ceramic, Glass and Stone Tile Installation" as published by the Tile Council of North America, Inc. is incorporated by reference into this Specification and is to be used as the primary guide for tile installation, unless noted otherwise.
1. Comply with the following installation methods:
 - a. F113 for dry floors on concrete at grade.
 - b. F113a for dry room floors on concrete above grade.
 - c. B414 and F121 for wet floors on concrete at grade and above grade.
 - d. W243 for dry walls
 - e. W244 for semi wet walls (apparatus bay, drying area, behind urinals and toilet fixtures).
 - f. B414 and W231/W241 for wet walls (shower, etc.)
 2. In addition, install tile in accordance with ANSI Specifications A108.1 through A118.1 and Manufacturer's recommendations. Masonry walls to receive tile shall have a leveling coat of mortar applied prior to installation of tile.
 3. Cut and drill neatly as required without marring tile. Rub smooth necessary cuts with a fine stone. Set cut edge against fixture, cabinet or other tile with joint at least 1/16-inch wide.
- F. Grout Application:
1. Installation to conform to ANSI A108.10. Lightly dampen absorptive, highly porous tile with clean, cool water but leave no standing water in the joints. Holding a rubber grout float at a 45° angle to the tile surface, force grout diagonally into joints ensuring joints are completely filled. Remove excess grout using edge of float held at a 90 angle.
 2. Spread no more grout than can be cleaned in 30 minutes from the time the grout begins to firm. Clean-up can begin when grout begins to firm, typically 10 - 30 minutes, depending on the type of tile and ambient temperature. Use as little water as possible for grout cleanup.
 3. Smooth and level joints and remove excess grout from tile with a damp (not wet) small pore (hydrophilic) grout sponge using a circular motion. Change water and rinse sponge frequently. Haze can be removed after as little as 3 hours with cheesecloth or a wrung-out sponge.
 4. Finished surface of joints shall be uniformly smooth, and continuously level with edges of tile.

- G. Expansion joints, control joints, insulation joints, etc., must be located in compliance with TCA EJ171 and filled with appropriate materials.
1. Joints must be carried through all layers of installation materials including tile, setting bed, mortar bed and reinforcing wire. Joints should be every 20 to 25 feet (6.1 to 7.3 m) in both directions for interior installations and 8 to 12 feet (2.4 to 3.6 m) in both directions for exterior installations. (Refer to TCA Handbook, EJ171 and ANSI AN-3.8 for details on placement, size and specifications of materials.)
 2. Workmanship for caulking and sealants shall conform to requirements of Section 07 92 00.
 3. Joints between tile and door frames and other metal accessories, tile and ceiling, wall tile and wall tile at inside corners and wall tile and floor tile shall be sealed with silicone rubber sealant.
 4. Provide expansion joints at tile columns, curbs and pipes and fill with sealant. At building structural joints extend expansion joints through the tile. Seal with sealant. In no case shall tile be carried over expansion joints without a joint in the tile.

3.4 GROUT CURING AND SEALING

- A. Damp cure all tile installations, including Portland cement grouts, for 72 hours minimum.
1. Cover with clean non-staining 40-pound Kraft paper.
 2. Do not use polyethylene sheets directly over tile on horizontal surfaces.
 3. Keep all traffic off newly installed floors for at least 72 hours. Protection may be necessary.
- B. Seal grout in accordance with manufacturer's recommendations.

3.5 TOLERANCES

- A. Tile: Do not exceed the following deviations from level and plumb, and from elevations, locations, slopes and alignments shown:
1. Horizontal surfaces: 1/8 inch in 10'-0" in all directions;
 2. Vertical surfaces: 1/8 inch in 8'-0" in all directions.
 3. Lippage: 1/8 inch maximum.
 4. Maximum Variation of Joint Width: 1/16 inch.

3.6 CLEANING

- A. Wipe surfaces clean after grouting, remove traces of mortar and grout. Do not use acid solution for cleaning glazed tile.
- B. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- C. Construction Waste: In accordance with Section 01 74 19.

3.7 PROTECTION

- A. Close spaces to traffic or other Work until tile is firmly set. Protect from damage until acceptance. Repair damaged Work at no additional cost to Owner.
- B. Prohibit foot and wheel traffic from using newly tiled floors for at least 7 days. Place large, flat boards in walkways and wheelways where use of newly tiled floor is unavoidable.

END OF SECTION

SECTION 09 51 00

ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 SUBMITTALS

- A. Shop Drawings: Submit Drawings showing complete layout of systems including attachments, intersections of members, seismic bracing, and edge conditions.
- B. Product Data: Provide data on metal grid system components and acoustical units.
- C. Samples:
 - 1. Submit 2 samples of each type of unit specified, including color selection when applicable.
 - 2. Submit samples of Manufacturer's full color selection for selection by Architect and Resident Engineer.
- D. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.2 QUALITY ASSURANCE

- A. Qualifications: Minimum of 2 years successful installation experience with manufacturer's specified products.
- B. Standards: Comply with the following:
 - 1. ASTM C635, "Standard Specification for Acoustical Tile and Lay-In Panel Ceilings."
 - 2. ASTM C636, "Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels."
 - 3. Ceilings and Interior Systems Construction Association (CISCA) "Recommendations for Direct-Hung Acoustical tile and Lay-in Panel Ceilings."

1.3 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact. Protect finished surfaces with removable wrapping or coating which will not bond when exposed to sunlight.
- B. Storage: Adequately protect against damage while stored at the site.
- C. Handling: Comply with Manufacturer's instructions.

1.4 MAINTENANCE

- A. Extra Materials: Provide an additional 5 percent of each type of acoustical unit installed, in unopened labeled cartons, to the Owner at completion of Work, for his maintenance use, at no additional cost. Provide, at minimum, one full carton of each type of acoustical unit.

PART 2 PRODUCTS

2.1 MATERIALS AND ACCESSORIES - GENERAL

- A. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
- B. Provide regional materials in accordance with Regional Materials provisions of Section 01 60 00.

2.2 SUSPENSION SYSTEM

- A. Ceiling Suspension System: Heavy duty (to meet seismic standards) with components formed from commercial quality cold rolled steel electro-zinc coated to comply with ceiling tile edge.
 - 1. Main-Runners: Minimum of 1-1/2 inch in height with an exposed capped face of 15/16 or 9/16 inch in width (as applicable for specified tile), nominally 12 feet long.
 - 2. Cross-Tees: Minimum of 1-1/2 inch in height with an exposed capped face in a width to match main runners.
 - 3. Finish: Exposed faces of main and cross runners shall be a baked enamel paint finish, white color.
 - 4. Suspension system shall support the ceiling system specified with a maximum deflection of 1/360 of the span.
- B. Hanger Wire: Galvanized steel conforming to Federal Specification FF-QQ-W-461, Finish 5, Class 1 annealed, and not less than 12 gage).
- C. Wall and Penetration Moldings: 24 MSG painted steel with a minimum one inch wide lower flange, finish and configuration to match grid. For circular penetrations provide edge molding manufactured to exact diameter of circular penetration.
- D. Hold-Down Clips: Provide access type hold-down clips where required by Acoustical Ceiling Manufacturer for type and condition and where panels weigh less than one pound per square foot.
- E. Seismic bracing and compression struts: As required to meet seismic requirements as noted on General Structural Notes.

2.3 CEILING PANELS

- A. Acoustical Ceiling Panel: Eclipse Clima Plus 2'-0" by 2'-0" by 3/4 inch by USG or equal (white color).

2.4 ACCESSORIES

- A. Acoustical Batt Insulation: Specified in Section 09 81 00.

PART 3 EXECUTION.

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing, with a copy to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Verify, before proceeding with this Work, that required inspections of existing conditions have been completed.

3.2 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636 and as supplemented in this Section. Design and construct system as required to meet seismic requirements as noted on General Structural Notes.
- B. Install system capable of supporting imposed loads to a deflection of 1/360 maximum.
- C. Locate system on room axis according to reflected ceiling plan.
- D. Install after major above-ceiling Work is complete. Coordinate the location of hangers with other Work.
- E. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.
- F. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- G. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extradistance.
- H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6 inches of each corner; or support components independently.
- I. Do not eccentrically load system, or produce rotation of runners.
- J. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. Provide edge moldings at junctions with other interruptions.
- K. Form expansion joints as detailed. Form to accommodate plus or minus 1 inch movement. Maintain visual closure.

3.3 INSTALLATION - ACOUSTICAL LAY-IN UNITS

- A. Install acoustical units in accordance with Manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.

- D. Install units after above-ceiling Work is complete.
- E. Install acoustical units level in uniform plane, and free from twist, warp and dents.
- F. Cut panels to fit irregular grid and perimeter edge trim. Field rabbet panel edge. Double cut and field paint exposed edges of reveal edge units.
- G. Where round obstructions occur, provide preformed closers to match edgemolding.
- H. Install hold-down clips to retain panels tight to grid system where required.

3.4 ERECTION TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/4 inch in 10 feet.

3.5 ADJUSTING

- A. Remove damaged or soiled panels and replace with new units, as directed by Architect and Resident Engineer.

3.6 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

SECTION 09 62 23
BAMBOO FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Tongue-and-groove bamboo plank flooring, accessories, and trim.

1.2 RELATED REQUIREMENTS

- A. Section 035400 - Cast Underlayment.
- B. Section 061000 - Rough Carpentry: New subfloor or underlayment.
- C. Section 090561 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.

1.3 REFERENCE STANDARDS

- A. CAL (VOC) - Standard Practice for the Testing of Volatile Organic Emissions From Various Sources Using Small-Scale Environmental Chambers (including Addendum 2004-01); State of California Department of Health Services; 2004.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this Section.
 - 1. Convene under general provisions of Section 017000.

1.5 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Specimen warranty and warranty conditions.
 - 5. Care and maintenance instructions and recommendations.
- C. Warranty: Submit manufacturer warranty and ensure that any required forms have been completed in Owner's name and registered with manufacturer.

1.6 SUSTAINABILITY SUBMITTALS

- A. LEED Submittals: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
 - 1. Product Data for Credit MR 4.1 and MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
 - 2. Product Certificates for Credit MR 5.1 and MR 5.2: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
 - a. Include statement indicating distance from manufacturer to Project for each regionally manufactured material.
 - b. Include statement indicating location of and distance from Project to point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials.

3. LEED Credit EQ 4.1: Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.
 4. Laboratory Test Reports for Credit EQ 4.1: For adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 5. LEED Credit EQ 4.2: Product data for paints and coatings used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.
 6. Credit EQ 4.3: Product data for flooring materials used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.
 7. LEED Credit EQ 4.4: Product data for products containing composite wood or aggrifiber products or wood glues indicating that they do not contain urea-formaldehyde resin.
- B. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements," for the following measures:
1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.

1.7 QUALITY ASSURANCE

- A. Single Source Responsibility: Obtain each type, color, and pattern of bamboo flooring products from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.
- B. Installer Qualifications: Acceptable to manufacturer with experience on at least five projects of similar nature in past two years.
- C. Regulatory Requirements:
 1. Comply with local regulations controlling use of volatile organic compounds for installation products.
 2. Slip Resistance: ASTM D2047, minimum static coefficient of friction; 0.6 for accessible routes, 0.8 for ramp.
- D. Certifications: Submit following:
 1. Manufacturer's certification that products furnished for project meet or exceed specified requirements.
 2. Manufacturer's certification attesting that Installer is trained and approved for application of materials.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to project site in manufacturer's protective containers.
- B. Do not deliver products during rain, snow, or other precipitation.
- C. Store products under cover and elevated above grade.
- D. Store solid bamboo planks in manufacturer's unopened packaging in a dry indoor location and keep dry; at least 72 hours prior to start of installation open packaging in rooms where it is to be installed and spread planks out to acclimatize.
- E. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.9 FIELD 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.
- B. Environmental Requirements: Maintain minimum air and subfloor temperature required by adhesive manufacturer in spaces to receive products for at least 72 hours prior to installation, during installation, and for not less than 48 hours after installation.
 - 1. Store products in spaces where they will be installed for at least 72 hours before beginning installation to achieve temperature stability.
 - 2. Do not install products until they are at same air and subfloor temperature as space where they are to be installed.
 - 3. After installation, maintain minimum air and subfloor temperature of 55 degrees F in areas where work is completed.

1.10 SEQUENCING

- A. Install products after other finishing operations, including painting, have been completed.
- B. Do not install bamboo flooring products on top of concrete slabs or underlayments until they are cured and are sufficiently dry to achieve bond with adhesive as determined by bamboo material manufacturer's recommended bond and moisture test.

1.11 MAINTENANCE

- A. Extra Materials: Furnish in accordance with Section 017000.
 - 1. Furnish extra material in quantity equal to 2 percent of total material furnished of bamboo flooring of each type, pattern and color.
 - 2. Store at job site where directed. Ensure boxes are identified by manufacturer, pattern, style, and color.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Manufacturers:
 - 1. Smith & Fong Company; PlybooStrand Bamboo Flooring: www.plyboo.com.
 - 2. Prior approved equal.

2.2 BAMBOO FLOORING SYSTEM

- A. Bamboo Flooring: Tongue and groove plank flooring made of natural bamboo strips laminated under pressure; factory finished.
 - 1. Style: "Vertical grain," with narrow edges of bamboo strips on visible surface; single layer laminated construction, all bamboo.
 - 2. Plank Width: 3-3/4 inches (92.25 mm).
 - 3. Plank Length: 72 inches (1830 mm).
 - 4. Edge Configuration: Tongue and groove, 4 sides.
 - 5. Product: Havana Strand
- B. Accessory Pieces: Matching construction, color, and finish; minimum piece length of 72 inches (1830 mm) unless otherwise indicated.
 - 1. Baseboards: Radiused top.
 - a. Height: 4 inches (102 mm), nominal.
 - 2. Reducer: Prefinished, 3/8 inch thick by 2 inches wide by 72 inches long.
 - a. Havana

2.3 ACCESSORY MATERIALS

- A. Floor Adhesive: 100 percent urethane-based adhesive specifically recommended by its manufacturer for flooring of the type to be installed.
 - 1. Waterproof.
 - 2. Materials required by bamboo flooring manufacturer for particular product and substrate moisture content and condition.
 - 3. Acceptable Products:
 - a. Bostik's Best, Bostik's TOK
 - b. Mapei EcoBond 980 or 990
 - c. DriTac 7500 Eco-Urethane
 - d. W.F. Taylor MS-Plus

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of bamboo flooring.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Verify that substrate is smooth, level, and dry.
- D. Cementitious Sub-floor Surfaces for Adhesive Installation: Verify that substrates are dry enough and ready for flooring installation by testing for moisture and pH.
 - 1. Test in accordance with Section 090561.
 - 2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.
- E. For Adhesive Installation: Perform a bond test using actual adhesive to be employed. Do not install unless satisfactory bond is obtained.
- F. Verify that flooring materials are in satisfactory condition for installation. Do not install scratched or otherwise damaged materials.
- G. Verify that flooring has been stored unwrapped at ambient temperature and humidity of the space in which it is to be installed for at least 7 days prior to installation.

3.2 PREPARATION

- A. Prepare floor substrates for installation of flooring in accordance with Section 090561.
- B. Grind and fill subfloor using methods and materials appropriate to the subfloor construction to eliminate high spots and depressions exceeding 3/16 inch (5 mm) inch in 10 feet (3048 mm).
- C. Comply with ASTM F710.
 - 1. Remove ridges, bumps, trowel marks and protrusions from substrate.
 - 2. Clean substrate to remove paint, dirt, oil, grease, sealers, release agents, hardening compounds, curing compounds, residual adhesives, and harmful substances which could impair performance of adhesive materials used with cork products.
 - 3. Fill depressions, low spots, cracks, joints, holes, indentations, and other defects with self-leveling cementitious underlayment in accordance with Section 035400.
 - 4. Vacuum clean substrate.
 - 5. Prime substrate in accordance with manufacturer's requirements

3.3 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.

- B. Maintain minimum ambient temperature of 70 degrees F (20 degrees C) prior to and during installation and for minimum of 48 hours after installation.
- C. Obtain manufacturer's instruction sheets and warranty limitations and maintain copies on site during installation.
- D. Install in accordance with manufacturer's instructions and warranty limitations.
- E. Install planks parallel to room's longest dimension, unless otherwise indicated or directed.
- F. Stagger end joints of boards; avoid placing adjacent end joints closer than 6 inches (150mm).
- G. Maintain at least 1/4 inch (6 mm) space between ends of planks and vertical walls; cover with trim fastened to allow expansion of planks.
- H. In doorways where adjacent floor finish is different, terminate flooring under centerline of door; provide divider strip.
- I. At open or exposed edges and where flooring terminates, provide tapered edge strip.
- J. Install wall base covering expansion space; miter inside and outside corners.
- K. Reducer and Transition Strips: Provide reducer strips at unprotected edges, exposed edges, and where flooring and carpet terminates.
 - 1. Provide transition strips at transitions from cork flooring to carpet.
 - 2. Center strip under door where flooring terminates at door openings.
 - 3. Install in longest lengths practicable with minimal joints.
 - 4. Fit joints tightly.
 - 5. Secure resilient strips to subfloor by using adhesive.

3.4 CLEANING

- A. Clean flooring to like-new condition using methods recommended by manufacturer.
- B. Immediately remove excess adhesive from surfaces without damage.
- C. Replace scuffed, scratched, broken, and discolored products.
- D. Re-install loose products.
- E. Clean surfaces in accordance with manufacturer's requirements. Do not use materials and methods which may damage finish and surrounding construction.

3.5 PROTECTION

- A. Prohibit traffic on floor for at least 72 hours after installation.
- B. Protect installed products until completion of project.
- C. Protect installed bamboo flooring during remainder of construction period with covering of heavy kraft paper or other suitable material. Do not use plastic sheet or film that might cause condensation.
 - 1. Do not move heavy and sharp objects directly over kraft-paper-covered bamboo flooring. Protect flooring with hardboard panels to prevent damage from storing or moving objects over flooring.
- D. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 09 65 13
RESILIENT BASE AND ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Resilient base.

1.2 RELATED REQUIREMENTS

- A. Section 035400 - Cast Underlayment.
- B. Section 090561 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.

1.3 REFERENCE STANDARDS

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.
- B. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012)e1.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
- D. Verification Samples: Submit three samples, 12 inch (304.8 mm) in size illustrating color and pattern for each resilient flooring product specified.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Wall Base: 10 linear feet (3 linear meters) of each type and color.
 - 3. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.
 - 4. Clearly identify each package.

1.5 SUSTAINABILITY SUBMITTALS

- A. LEED Submittals: Provide special submittals conforming to Section 018113 – Sustainable Design Requirements for the following:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
 - 2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
 - a. Include statement indicating location of manufacturer and point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials.

Indicate distance to Project and fraction by weight of each regionally manufactured material that is regionally extracted.

3. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the specified materials. Provide the product manufacturer's most current VOC emissions data.
4. Laboratory Test Reports for Credit IEQ 4.1: For adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
5. LEED Credit EQc4.3: Provide FloorScore documentation demonstrating that hard surface flooring submitted for installation are FloorScore certified and meet most current VOC emissions data.

- B. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.

1.6 QUALITY ASSURANCE

- A. Indicate portion of wall represented by mockup on Drawings or draw mockup as separate element. Mockups can be useful for setting a workmanship standard resilient base with job- formed corners.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Coordinate mockups in this Section with mockups specified in other Sections.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store materials in manufacturer's original unopened containers, with brand names and production lot numbers clearly marked.
- B. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.8 FIELD CONDITIONS

- A. Maintain temperature in storage area between 55 degrees F (13 degrees C) and 90 degrees F (72 degrees C), in spaces to receive resilient products during the following time periods:
 1. 48 hours before installation.
 2. During installation.
 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).
- C. Install resilient base and accessories after other finishing operations, including flooring and painting have been completed.

1.9 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Resilient Base and Accessories: Provide manufacturer's warranty, as follows:
 1. Materials: Minimum 2 years from date of purchase.
 2. Installation: Minimum 2 years from date of installation; warrant entire installation against loss of adhesion to substrates.

PART 2 PRODUCTS

2.1 RESILIENT BASE

- A. Refer to Finish Schedule for selected products.
- B. General: Comply with adhesives and sealants and flooring system product requirements specified in Section 016000.
- C. Resilient Base: ASTM F1861, Type TP, rubber, thermoplastic; top set , and as follows:
 - 1. Height: 4-1/4 inch (107.9) mm.
 - 2. Length: Roll.
 - 3. Color: Brown 502.
 - 4. Accessories: Premolded external corners and end stops.
 - 5. Basis of Design Product:
 - a. Burke Flooring; Product Profiles; Art Deco: www.burkemercer.com.
 - b. Other Acceptable Manufacturer:
 - 1) Johnsonite, a Tarkett Company: www.johnsonite.com.
 - 2) Roppe Corp.: www.roppe.com.
 - 3) Prior approved equal.

2.2 ACCESSORIES

- A. Adhesive: Water based type, zero (0) VOC content, spray application, water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
 - 1. Comply with regionally-sourced, urea-formaldehyde prohibition, adhesives and sealants, and volatile organic compound (VOC) product requirements specified in Section 016116.
- B. Use primers that comply the more stringent VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.
- C. LEED Requirements - LEED Credit EQc4.1 - Adhesives and Sealants shall meet low VOC content as determined by LEED requirements; VOC content shall not exceed 50grams/liter.
- D. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168.
 - 1. Adhesives shall meet or exceed the VOC and chemical component limits of Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit requirements.
 - 2. Current requirement refers to the date on which the materials are installed in the building.
 - 3. SCAQMD Rule #1168 referenced in Section 018113 that was current as of the date of this specification. Refer to <http://www.aqmd.gov/rules> for the actual current version of the rule that will be applicable at the date of installation during construction.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Verify that gypsum board is finished to the floor and that gaps do not exist.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces 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 substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than [9] [10] <Insert number> pH.
 - 4. Moisture Testing: Proceed with installation only after substrates pass testing according to manufacturer's written recommendations, but not less stringent than the following:
 - a. Perform anhydrous calcium chloride test according to 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 according to ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient products until they are the same temperature as the space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install in accordance with manufacturer's instructions.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Fit joints tightly.
- E. Set base in place, press with heavy roller to attain full adhesion.

3.4 RESILIENT BASE

- A. 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.
- B. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
 - 1. Pieces less than 10 feet long are not permitted. Seams are not permitted between wall corners spaced less than 10 feet apart.
- C. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- D. Fit joints straight, tight, and vertical.
- E. Install on solid substrate backing.
- F. Bond tight to wall and floor surfaces.

- G. Scribe to door frames and other interruptions.
 - H. Do not stretch resilient base during installation.
 - I. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
 - J. Preformed Corners: Install preformed corners before installing straight pieces.
 - K. Job-Formed Corners:
 - 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.
 - a. Form without producing discoloration (whitening) at bends.
 - b. Wrap base around corner after using cove base groover tool by Gundlach to make V-shaped vertical cut in back of base at corner.
 - 2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.
 - a. Miter or Cope corners to minimize open joints.
 - L. Fit joints tightly and make vertical. Install in longest lengths possible; maintain minimum dimension of 18 inches (45 mm) between joints.
 - M. Align tops of adjacent sections.
 - N. Change from cove base to straight base at flooring transition strips.
 - O. Install base on solid backing. Bond tightly to wall and floor surfaces.
- 3.5 CLEANING
- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
 - B. Immediately remove excess adhesive from surfaces without damage.
 - C. Replace scuffed, scratched, broken, and discolored products.
 - D. Re-install loose products.
 - E. Clean surfaces in accordance with manufacturer's requirements. Do not use materials and methods which may damage finish and surrounding construction.
- 3.6 PROTECTION
- A. Protect work from damage from subsequent construction operations so there will be no indication of use and damage at time of acceptance.

END OF SECTION

SECTION 09 65 19
RESILIENT FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Static control resilient tile flooring.
- B. Installation accessories.

1.2 RELATED REQUIREMENTS

- A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 035400 - Cast Underlayment.
- C. Section 090561 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.
- D. Section 260526 - Grounding and Bonding for Electrical Systems: Grounding and bonding of static control flooring to building grounding system.

1.3 REFERENCE STANDARDS

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.
- B. ASTM F150 - Standard Test Method for Electrical Resistance of Conductive and Static Dissipative Resilient Flooring; 2006 (Reapproved 2013).
- C. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2010)e1.
- D. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; National Fire Protection Association; 2011.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Shop Drawings: Indicate seaming plan.
- D. Verification Samples: Submit three samples, full size illustrating color and pattern.
- E. Submit following Informational Submittals:
 - 1. Certifications specified in Quality Assurance article.
 - 2. Qualification Data: Installer's qualification data.
 - 3. Manufacturer's Instructions:
 - a. Application temperature and humidity range.
 - b. Floor moisture content range.
 - c. Bond and moisture test procedures including frequency and duration.
 - d. Special procedures.
 - e. Perimeter conditions requiring special attention.
- F. Closeout Submittals: Include polishing/waxing information.
- G. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of sub-floor is acceptable.

- H. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Furnish not less than 5-percent, in roll form of each different composition, wearing surface, color, and pattern of resilient sheet floor covering installed.
 - 3. Furnish extra tile in quantity equal to 2 percent of total material furnished but not less than:
 - a. One unopened box of tile for each 50 boxes or fraction thereof installed of resilient tile of each type, pattern and color.

1.5 SUSTAINABILITY SUBMITTALS

- A. LEED Submittals: Provide special submittals conforming to Section 018113 – Sustainable Design Requirements for the following:
 - 1. Product Data for Credit MR 4.1 and MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
 - 2. Product Certificates for Credit MR 5.1 and MR 5.2: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
 - a. Include statement indicating distance from manufacturer to Project for each regionally manufactured material.
 - b. Include statement indicating location of and distance from Project to point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials.
 - 3. LEED Credit EQ 4.1: Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.
 - 4. Laboratory Test Reports for Credit EQ 4.1: For adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - 5. LEED Credit EQ 4.2: Product data for paints and coatings used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.
 - 6. Credit EQ 4.3: Product data for flooring materials used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.
- B. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements," for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.
- B. 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 for floor floor tile and accessories.

- a. Size: Minimum 100 sq. ft. for each type, color, and pattern in locations directed by Architect.
- 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 SEQUENCING

- A. Sequence work under provisions of Section 013000.
- B. Install products after other finishing operations, including painting, have been completed.
- C. Do not install resilient products on top of concrete slabs until they are cured and are sufficiently dry to achieve bond with adhesive as determined by resilient material manufacturer's recommended bond and moisture test.
- D. Coordinate installation of resilient base, reducer strips with installation of:
 - 1. Tile Carpeting specified in Section 096813.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project Site in manufacturer's unopened containers clearly marked with manufacturer's name, brand, size, thickness, grade, color, and design.
- B. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- C. Store all materials off of the floor in an acclimatized, weather-tight space.
- D. Store flooring materials within installation location for minimum of 7 days prior to commencing installation to allow materials to acclimatize.
- E. Maintain temperature in storage area between 55 degrees F (13 degrees C) and 90 degrees F (72 degrees C).
- F. Protect roll materials from damage by storing on end.
- G. Do not double stack pallets.

1.9 FIELD CONDITIONS

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F (21 degrees C) to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F (13 degrees C).
- B. Comply with requirements of athletic flooring material supplier's requirements.
- C. Maintain minimum air and subfloor temperature required by adhesive manufacturer in spaces to receive products for at least 72 hours prior to installation, during installation, and for not less than 48 hours after installation.
- D. Do not install products until they are at same air and subfloor temperature as space where they are to be installed.
- E. After installation, maintain minimum air and subfloor temperature of 55 degrees F and under 50% relative humidity in areas where work is completed.

PART 2 PRODUCTS

2.1 MANUFACTURERS - GENERAL

2.2 PERFORMANCE REQUIREMENTS

- A. Fire Resistance Ratings:
- B. Provide resilient flooring which complies with fire resistance ratings for locations scheduled on Drawings.
 - 1. Critical radiant flux:
 - a. Test method: ASTM E648.
 - b. Value: Not less than 0.22 watts per square centimeter.
 - 2. Flame spread:
 - a. Test method: ASTM E84.
 - b. Index: 25 or less.
 - 3. Flooring, base, and related elements shall not continue to propagate fire.
 - 4. Smoke generated:
 - a. Test method: ASTM E662.
 - b. Index: 450 or less.

2.3 TILE FLOORING

- A. Static Control Tile: Homogenous; color and pattern throughout thickness.
 - 1. Refer to Finish Schedule for selected products.
 - 2. Minimum Requirements: Vinyl composition tile complying with ASTM F1066, Class 2.
 - 3. Static Load Limit: ASTM F 970, 75 psi (5.27 kg/sq cm).
 - 4. Electrical Resistance: ESD-S7.1; ASTM F150.
 - 5. Point to Point and Point to ground 106 to 109 ohms.
 - 6. Static Generation: ESC STM 97.2 (flooring in combination with footwear and a person)
 - a. 40% R.H. with ESD shoes: Less than 10 volts.
 - b. 12% R.H. with ESD shoes: Less than 100 volts.
 - 7. Static Decay:
 - a. Flooring in combination with footwear (ESD shoes) and a person (5000 volts to zero): 0.5 seconds average.
 - b. Federal Test 101C, Method 4046 (5000 volts to zero): Less than 0.5 seconds.
 - 8. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.

2.4 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient sheet flooring manufacturer for applications indicated.
- C. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.
 - 1. Static-Control Adhesive: Adhesive product of floor covering manufacturer that produces conductive continuity of floor covering system.
 - 2. Materials required by resilient product manufacturer for particular product and substrate moisture content and condition.
 - 3. Removable adhesive with antimicrobial additive; approved by resilient product manufacturer.
 - 4. Adhesives shall meet VOC and chemical component limits of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 and Cal GREEN Table 5.504.4.1 Adhesive VOC Limit requirements.
- D. Metal Trim: Metal trim, style, configuration, and dimensions as indicated, for setting using tile mortar or adhesive.

1. Applications:
 - a. Open edges of floor tile.
 - b. Transition between floor finishes of different heights.
 - 1) Resilient flooring transitions.
- E. Copper Grounding Strips: Type and size as recommended by static control flooring manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
 1. Ensure concrete has cured 60 days minimum.
 2. Test in accordance with Section 090561.
 3. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare floor substrates for installation of flooring in accordance with Section 090561.

3.3 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install in accordance with manufacturer's instructions.
- C. Adhesive:
 1. Apply at rate and in pattern required by manufacturer.
 2. Apply to provide continuous bond between resilient material and substrate. Do not allow adhesive to bleed through joints.
 3. Spread only enough adhesive to permit installation of materials before adhesive's initial set.
 4. Embed grounding strips in static-control adhesive for static dissipative tiles. Extend strips beyond perimeter of static-control resilient floor covering surfaces to ground points.
- D. Place copper grounding strip in conductive adhesive and apply additional adhesive to top side of strip before installing static control flooring. Allow strip to extend beyond flooring in accordance with static control flooring manufacturer's instructions. Refer to Section 260526 for grounding and bonding to building grounding system.
- E. Fit joints tightly.
- F. Scribing:
 1. Produce tight hairline joints.
 2. Scribe to walls, columns, cabinets, floor outlets, floor penetrations, and other appurtenances.
 3. Scribe, cut and fit exposed edges at adjoining construction and neatly abut.
- G. Set flooring in place, press with heavy roller to attain full adhesion.

- H. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- I. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
 - 1. Metal Strips: Attach to substrate before installation of flooring using stainless steelscrews.
 - 2. Resilient Strips: Attach to substrate using adhesive.
- J. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to product-tight joints.
- K. Set in place, press with roller to attain full adhesion and eliminate air bubbles and wrinkles. Use roller of weight required by resilient flooring manufacturer.
- L. Extend unexposed edges under set-on bases and similar trim work.
- M. Terminate at centerline of door openings where adjacent floor finish is dissimilar.
- N. Install in pan type floor access covers; maintain pattern of surrounding flooring.
- O. Extend into closets and offsets and under movable equipment of rooms and spaces indicated or scheduled to receive flooring, including recessed covers within those spaces.

3.4 TILE FLOORING

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless manufacturer's instructions say otherwise.
- B. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.
- C. Install tile to indicated pattern. Allow minimum 1/2 full size tile width at room or area perimeter.

3.5 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's instructions.
- C. Replace scuffed, scratched, broken, and discolored products.
- D. Re-install loose products.
- E. Clean surfaces in accordance with manufacturer's requirements. Do not use materials and methods which may damage finish and surrounding construction.

3.6 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.
- B. Cover resilient sheet flooring until Substantial Completion.
- C. Protect work from damage from subsequent construction operations so there will be no indication of use and damage at time of acceptance.

END OF SECTION

SECTION 09 77 33

FRP WALL PANELS

PART 1 GENERAL

1.1 SUBMITTALS

- A. Product Data: Manufacturer's Specifications and installation instructions for each material and accessory.
- B. Submit Manufacturer's full range of color and pattern samples of wall panels and trim pieces for Architect's and Resident Engineer's selection. Submit two samples of selected products.
- C. Submit cleaning and maintenance instructions in accordance with Section 01 77 00.
- D. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.2 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials clearly labeled to identify Manufacturer, brand name, quality or grade and fire hazard classification.
- B. Store horizontally in original undamaged packages.

1.3 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: Install materials when temperature and humidity conditions approximate conditions that will exist when building is occupied.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Furnish products of one of the specified Manufacturers, except as approved by the Architect and Resident Engineer, subject to compliance with Specification requirements.
 - 1. Marlite www.marlite.com
 - 2. Kemlite Company, Joliet, IL (800) 435-0080. www.kemlite.com
 - 3. Or equal.

2.2 MATERIALS

- A. General
 - 1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 - 2. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
- B. FRP Panels: Fiberglass reinforced plastic panels complying with the following:
 - 1. Class: Class I (A) FR panels.
 - 2. Thickness: 0.090.

3. Texture: Smooth.
 4. Color: White.
- C. Adhesive for panel installation:
1. Manufacturer's recommended type for use with selected materials, waterproof, mildew resistant nonstaining type.
 2. In accordance with the low-emitting materials requirements of Section 01 60 00 - Materials and Equipment.
- D. Edge Sealant:
1. Type "E" clear mildew resistant silicone sealant as specified in Section 07 90 00, or mildew resistant sealant recommended by manufacturer for sealing panel edges and moldings.
 2. In accordance with the low-emitting materials requirements of Section 01 60 00 - Materials and Equipment.
- E. Moldings: Provide one of the following as selected by Architect and Resident Engineer.
1. Extruded anodized aluminum trim pieces, sizes as required to allow installation over combined thickness of panel and substrate. Use at internal and external corners.
 2. One-piece vinyl of the following types, color to match FRP.
 - a. Panel Edges: "J" type Cap molding.
 - b. Panel to Panel: "H" type Division Bar molding.
 - c. Inside Corner: "J" type Inside Corner molding with radius edge.
 - d. Outside Corner: "J" type Outside Corner molding with extended leg.
 - e. Ceiling: "J" type Ceiling molding with radius edge, or use inside corner molding.
- F. Fasteners: Manufacturer's standard nylon drive pins.
- G. Miscellaneous Items: Furnish and install supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation whether or not specified or indicated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions:
1. Examine substrate and conditions under which the material is to be installed.
 2. Verify that surfaces, when tested with moisture meter, have proper moisture content.
 3. Verify that nails and screws are recessed, with joints and depressions taped, finish and sealed.
 4. Remove contaminants from areas to be covered.
 5. Do not proceed with Work until Work of other Trades which passes through wall covering has been completed and unsatisfactory conditions have been corrected.
 6. Start of Work indicates acceptance of responsibility for performance and any required remedial Work.

3.2 INSTALLATION

- A. Install panels in accordance with Manufacturer's printed instructions using fullsheet mastic coverage method plus nylon fasteners.

- B. Make joints with 1/8 inch space for expansion and use moldings designed for each condition for the Project.
- C. Bevel back edges of panels with block plane to permit proper fit into moldings.
- D. Place a continuous bead of sealant in the receiver channel of all moldings immediately prior to installation of FRP panels. Place continuous bead of sealant at all edges and tool to smooth, slightly concave shape.
- E. If one end of panel must be mechanically fastened, do not fasten the other end.
- F. Remove plumbing escutcheons, switchplates, wall plates, and surface-mounted fixtures, and cut wall paneling evenly to fit. Replace items after completion of Work.
- G. Where applicable, install paneling before installation of plumbing, casings, bases, cabinets and other items to be applied over paneling.

3.3 CLEANING

- A. Remove excess adhesive and smudges with soft cloth and mineral spirits.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

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SECTION 09 91 00

PAINTING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Painting as specified and as noted on Drawings. Surfaces requiring finishing and left unfinished by the requirements of other Sections shall be painted or finished as part of the Work of this Section.
 - 1. Gypsum board shall be prime coated and receive 2 coats of paint.
 - 2. Finished hardwood materials shall be stained, sealed and varnished.
 - 3. Door frames, metal doors, and miscellaneous metals shall be painted unless provided with factory finish.
 - 4. Exterior metal (building structure) which does not receive a factory finish shall be painted using High-Performance Finish Systems.

1.2 DEFINITIONS

- A. Touch-Up: Painting of items missed by painter at no additional cost to Owner.
- B. Re-Paint: Repairs to paint work for damages caused by other trades.
- C. Block Resistance (Non-Blocking): The capability of a coating to resist sticking to itself when used on 2 surfaces that come in contact with each other (e.g. door and jamb, window sash and sill).

1.3 SUBMITTALS

- A. Product Data: Submit schedule of manufacturers of products required for the Work, together with specifications recommended by each manufacturer.
- B. Samples: Submit samples of each type of finish specified.
 - 1. Architect will furnish Contractor a color schedule of colors selected either from manufacturer's stock colors or specially requested color mixes before Work is begun.
 - 2. Submit two 8 inch x 10 inch samples of each color, including the correct sheen and texture, on heavy cardboard or masonry. Submit sealer and stain finishes on material of the same quality and species of wood on which that particular finish shall be used. Rejected samples shall be resubmitted until approved.
 - 3. Samples shall be submitted at least 30 days prior to the start of painting work. Label and identify each sample as to location and application. Upon submittal of color samples, minor variations or changes in color selection may be requested by the Architect and new samples ordered, until final color approval.
- C. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.4 QUALITY ASSURANCE

- A. Standards: Preparation, application and workmanship shall be in accordance with manufacturer's recommendations and applicable provisions of the following:
1. Painting and Decorating Contractors of America (PDCA) "Painting Specification Manual" and "Standards".
 - a. PDCA P1-09, "Touch-Up Painting and Damage Repair - Financial Responsibility and Definition of a Properly Painted Surface."
 - b. PDCA P2-09, "Third Party Inspections: Qualifications, Responsibilities and Procedures."
 - c. PDCA P3-09, "Designation of Paint Color."
 - d. PDCA P4-09, "Responsibility for Inspection and Acceptance of Surfaces Prior to Painting and Decorating."
 - e. PDCA P5-09, "Benchmark Sample Procedures for Paint and Other Decorative Coating Systems."
 2. Gypsum Association - GA210, "Gypsum Board for Walls and Ceilings."

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packing and Shipping: Deliver materials to site in manufacturer's sealed containers, legends and labels, intact.
- B. Storage:
1. Adequately protect against damage while stored at site.
 2. In no case shall the amount or method of materials stored exceed the amount permitted or the manner allowed by local ordinances, state laws, or fire underwriter regulations.

1.6 PROJECT/SITE CONDITIONS

- A. Physical Requirements for Proper Installation or Application: Do not apply exterior paint in damp or rainy weather or until after the surface has dried thoroughly from the effects of such weather.
1. Do not apply varnish or paint when temperature is below 50 degrees F.. Avoid painting surfaces exposed to hot sunlight.
 2. During interior application, maintain minimum temperature of 65 degrees F. unless otherwise directed by Architect or manufacturer's printed instructions. Hold temperature as constant as possible.
 3. Provide adequate ventilation at all times so the humidity cannot rise above the dew point of the coldest surface to be painted.
 4. Moisture-containing surfaces, such as concrete, stucco and cement plaster shall have a moisture content of less than 8 percent as measured by moisture meter. Remove surface salt deposits prior to painting. Verify that pH is neutral, or within acceptable limits of Paint Manufacturer. Paint after thoroughly cured.

1.7 MAINTENANCE

- A. Extra Materials: Upon completion of the Work, furnish Owner with one fresh gallon of each type and color of paint and finish used on this Project. Label containers with manufacturer's name, batch, color, shelf life, instructions, and cautions.

1.8 WARRANTY

- A. Manufacturer's Standard Warranty: Furnish 2 year manufacturer's standard warranty covering materials and labor required to maintain paint finishes in good condition from date of Substantial Completion of the Work.
1. Warranty shall cover repair or replacement of paint finishes (interior and exterior) that fail in materials or workmanship.
 2. Warranty shall cover all materials and installation from the substrate up including, but not limited to, removal of defective finishes, surface preparation, primers and finish coats in accordance with original specifications.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Furnish products of one of the following manufacturers, except as otherwise approved by Architect, subject to compliance with specification requirements.
1. Sherwin Williams
 2. Dunn-Edwards Corporation
 3. ICI Paints
 4. Kelly-Moore Paint Co.
 5. Or Equal.

2.2 MATERIALS

- A. General
1. LEED Certification:
 - a. Contractor shall provide paint in compliance with USGBC LEED-NC 2009 Credit EQc4.2 which requires that paints and coatings used on the interior of the building (defined as inside of the weatherproofing system and applied on-site) comply with the criteria listed on the Low Emitting Materials Form, Section 00 62 33:
 - b. See Sections 01 81 13 and 01 60 00.
 2. Paints and coatings shall comply with CALGreen section 504.4.3.
 3. Colors: As selected by Architect
 - Option 1:
 - A. Sherwin Williams SW6109 - Hopsack (or equal)
 - B. Sherwin Williams SW7014 - Elder White (or equal)
 - C. Sherwin Williams SW7020 - Black Fox (or equal)
 - Option 2:
 - A. Sherwin Williams SW7710 - Brandywine (or equal)
 - B. Sherwin Williams SW7531 - Canvas Tan (or equal)
 - C. Sherwin Williams SW7020 - Black Fox (or equal)

- B. Provide materials in accordance with the Schedule of Paint Products at the end of this Section as applicable to project and as follows:
1. Block resistant (non-blocking) materials shall be used for doors, door jambs, railings and other locations subject to handling, or where surfaces will come into contact with other painted surfaces or belongings.
 2. Shall not be formulated or manufactured with formaldehyde, halogenated solvents, aromatic hydrocarbons, mercury, or mercury compounds, or tinted with pigments of lead, cadmium, chromium VI, and their oxides
 3. Shall not be formulated or manufactured with formaldehyde, mercury, or mercury compounds, or tinted with pigments of lead, cadmium, chromium VI, and their oxides.

4. Materials used shall comply with applicable Federal and local air pollution regulations, lead content laws, and current VOC requirements. If products listed in Schedule of Paint Products located at the end of this Section are not in compliance with regulations, laws, or requirements, Contractor shall notify Architect and Resident Engineer and shall provide information regarding substitute products.
- C. Basic painting materials such as linseed oil, shellac, turpentine, thinners, driers, and other similar products, shall be of highest quality, made by reputable, recognized manufacturers, and have identifying labels on containers. Paint materials shall be factory fresh.
- D. Alternate materials submitted for approval shall have qualities and materials equal to the other listed manufacturer's scheduled products. Materials selected for coating systems for each type of surface shall be the products of a single manufacturer, unless otherwise specified or scheduled.
- E. Standard Gloss Range: Provide paints in accordance with the following ranges in accordance with ASTM D523 and in accordance with Finish Legends on drawings:

<u>Sheen</u>	<u>Geometry</u>	<u>Gloss Range</u>
Flat	85 degree	Below 15 (see also Paint Finishes herein)
Eggshell	60 degree	5-20
Lo Luster	60 degree	15-25
Semi-Gloss	60 degree	25-50
Gloss	60 degree	Over 50

- F. Paints shall be ready mixed except for field catalyzed coatings.
- G. In addition to other requirements specified herein, provide the following when deemed appropriate:
1. Low-Biocide Paint: Interior use. Shall not contain formaldehyde. Shall not contain fungicides or bactericides that are classified as mercury acetates, phenol phenates, or phenol formaldehyde.
 2. Natural Plant- and Mineral-Based Finishes: Contain extracts from plant sources and minimally processed earth minerals, such as chalk or iron oxides. Solvents include citrus oils and small amounts of low-odor petroleum solvents (de-aromatized isoparaffinics).
 3. Milk-Based Paint: Contains lime, milk protein, clay, and earth pigments; interior use only; not suitable for damp conditions
 4. Clay- and Mineral-Based Pigments:
 - a. Native earths: Ochre, raw umber, raw sienna
 - b. Calcined earths: Burnt umber, burnt sienna
 - c. Iron oxides: Mars black, Mars yellow, Mars violet
 5. Biocides: Provide paint with levels below 0.025%.
- H. Transparent Finishes:
1. Urethane finishes: Water emulsion urethane
 2. Penetrating oil-based, waterborne finishes: Shall not contain lead acetate or cobalt manganese (drying agents)
 3. Stain: Vegetable oil-based, waterborne stain for exterior use with UV Protection
 4. Acrylic: Waterborne, urethane; VOC less than 100grams/liter
 5. Plant-based oil finish: Low odor, water reducible; interior use
 6. Polymerized linseed oil: Interior use
 7. Polymerized tung oil: Interior Use
- I. Paint Strippers - Low-Emitting: Shall not contain methylene chloride. Avoid products containing methanol and trichloroethane.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report in writing with a copy to Architect and Resident Engineer, conditions detrimental to Work. Commencement of Work will be construed as acceptance of subsurfaces.

3.2 PROTECTION

- A. Before painting, remove hardware, accessories, electrical plates, lighting fixtures and similar items and protect.
 - 1. Provide "Wet-Paint" signs and other barricades and protections as required to protect adjacent surfaces and work of other trades, whether being painted or not.
 - 2. Mask permanent labels.
 - 3. Provide, distribute, and maintain a sufficient supply of clean drop cloths and other protective coverings.
 - 4. Protect foliage and other exterior finished surfaces from contact with cleaning materials and thoroughly flush with water after contact.
 - 5. On completion of each space, replace above items.

3.3 SURFACE PREPARATION

- A. General:
 - 1. Surfaces requiring painting or finishing shall be thoroughly dry and cured, free of dirt, dust, rust, stains, scale, mildew, wax, grease, oil, deteriorated substrates, bond-breakers, efflorescence and other foreign matter detrimental to the coating's adhesion and performance. Repair voids, cracks, nicks and other surface defects with appropriate patching material. Finish flush with surrounding surfaces and match adjacent finish texture.
 - 2. Spot prime marred or damaged shop coats on metal surfaces with appropriate metal primer.
 - 3. Determine moisture content of plaster, stucco, cementitious materials, wood and other moisture-holding materials by use of a reliable electronic moisturemeter.
 - 4. Determine alkalinity of plaster, stucco and other cementitious materials by performing appropriate tests.
 - 5. Do not paint surfaces where moisture content or alkalinity exceeds that which is allowed by paint manufacturer.
- B. Wood:
 - 1. Sandpaper to smooth and even surface and then dust off. After primer or stain coat has been applied, thoroughly fill nail holes and other surface imperfections with putty tinted with primer or stain to match wood color. Sand woodwork between coats to a smooth surface. Cover knots and sap streaks with a thin coat of shellac, or seal with a suitable stain blocking sealer.
 - 2. Finish door and window edges after final fitting. Finish interior of cabinets in the same manner as the exterior unless otherwise specified. Seal interior of drawers unless otherwise specified.

3. Backpriming:
 - a. Backprime exterior woodwork, which is to receive paint finish, with exterior primer paint.
 - b. Backprime interior woodwork, which is to receive paint or enamel finish, with enamel undercoater paint.
 - c. Backprime interior and exterior woodwork, which is to receive stain and/or varnish finish with VOC compliant varnish acceptable to the Architect and Resident Engineer.
 - d. Back-prime wood trim before installation.
 4. Where existing stained surfaces are indicated to be coated with a transparent stain, test apply stain to small area where directed by Architect and Resident Engineer and obtain Architect's and Resident Engineer's approval of color.
- C. Steel and Iron:
1. Remove grease, oil, mill scale, rust and rust scale and touch-up chipped or abraded places on items that have been shop coated. Remove and reprime incompatible or damaged shop applied primers. Comply with the Steel Structures Painting Council's (SSPC) recommendations for cleaning of uncoated steel and iron surfaces.
 2. When area will be exposed to view, sandpaper the entire primed area smooth, feather the edge of surrounding undamaged prime coat and spot prime in a manner to eliminate evidence of repair.
 3. Where steel or iron at existing Work have a heavy coating of scale, remove by sand blasting, sanding, descaling, grinding or wire brushing, as necessary, to produce a satisfactory surface for painting.
- D. Galvanized Metal and Aluminum:
1. Thoroughly clean by wiping surfaces with a non-hydrocarbon solvent that will not leave an oily residue. Apply surface conditioner or vinyl-wash pretreatment as required for proper adhesion if required by paint manufacturer. Prime galvanized metal with galvanized iron primer as recommended by paint manufacturer. A test sample of the complete painting system should be applied and checked for adhesion before final painting begins.
 2. Clean visible portions of throats of galvanized steel ductwork with solvent; wipe dry with clean rags and paint flat black.
- E. Concrete:
1. Existing exposed concrete structure shall be patched smooth to the satisfaction of the Architect and Resident Engineer prior to painting.
 2. The method of surface preparation shall be at Contractor's discretion, provided the results are satisfactory to the Architect and Resident Engineer, and the method is in compliance with applicable codes and requirements.
 3. Repair surfaces to be painted prior to application of prime and finish coat(s). Apply a tinted primer to the substrate to help identify surface imperfections. After the primer has thoroughly dried, patch, fill and repair surface imperfections to match and flush-out with adjacent finish texture and profile.
 4. Before first paint coat is applied, spot prime nails and other exposed metal occurring in the surfaces with a rust inhibitive primer as recommended by paint manufacturer.

- F. Plaster and Gypsum Board Surfaces:
1. Fill cracks, holes or imperfections with compatible patching material and smooth off to match adjoining surfaces. Before painting, surfaces shall be first tested for dryness with a moisture testing device.
 2. Apply no paint or sealer on gypsum board or plaster when the moisture content exceeds 8 percent. Test sufficient areas in each space and as often as necessary to determine if the surface has the proper moisture content for painting. If the moisture content is between 8 percent and 12 percent, prime with alkali resistant primer.
 3. If 8 percent or less, prime with specified primer. Remove the dry salt deposits from plaster surfaces by brushing with a stiff brush before painting.

3.4 WORKMANSHIP

- A. Apply products to achieve paint manufacturer's printed specifications for dry mil thickness
- B. Apply each coat of paint evenly and comply with manufacturer's drying time before applying subsequent coats.
- C. Finished work shall be uniform, match approved color, texture and coverage, and free from runs, sags, clogging or excessive flooding. Make edges of paint adjoining other materials or colors sharp and clean, without overlapping. Where varnishes or enamel is used, lightly sand, dust and clean undercoats to obtain a smooth finish coat. Sand carefully between each coat of finish on smooth surfaces for good adhesion of subsequent coats.
- D. Where clear finishes are required, ensure tinted fillers match wood. Work fillers well into the grain before set. Wipe excess from the surface.
- E. Where specific mil thicknesses are required, check thickness by the following methods:
1. Over ferrous metal - Elecometer Film Gauge
 2. Other surfaces - Tooke Dry Mil Inspection Gauge

3.5 APPLICATION

- A. The number of coats scheduled is the minimum number of coats required. Additional coat(s) shall be applied, at no additional cost to the Owner, to completely hide base material, provide uniform color and to produce satisfactory finish results.
- B. Apply coatings without thinning except as specifically required by label directions, or required by these specifications. In such cases, thinning shall be the minimum reduction permitted.
- C. Priming will not be required on items delivered with prime or shop coats, unless otherwise specified. Review other specification sections in which primers are provided to ensure compatibility of the total system for various substrates. Touch up prime coats applied by others as required to ensure an even primed surface before applying finish coat.

- D. Plumbing, Mechanical and Electrical:
1. Exterior and interior exposed water, gas, waste piping, sprinkler piping, conduit, lighting and electrical panels, telephone terminal boxes, galvanized ducts and insulated ducts, shall be painted in areas other than mechanical rooms, unless otherwise scheduled.
 2. Paint exposed unfinished fixtures, metal ducts, switch boxes, control panels, devices, starters, junction boxes, vents, drains, and other similar items, as directed by Architect and Resident Engineer.
- E. Spray paint prime coated (not pre-finished) grilles and registers with enamel or lacquer to match walls and ceilings. Paint materials shall not sag, run or bind movable parts of grilles, registers, louvers, baffles and other similar items.
1. Throats of ducts shall be given one coat of flat black paint, wherever visibility of the interior of the duct is allowed through registers or other similar items. At fiber lined duct, use black latex paint.
 2. Examine the Mechanical and Electrical Drawings and Specifications to determine the amount of exposed work to be painted.
- F. Paint exposed surfaces of every member; paint items inaccessible after installation before installation, if required to be painted. Edges, tops and bottoms of wood doors shall be sealed and finished with the same finish as the door faces, to meet door manufacturer's warranty requirements. Verify edge color with Architect and Resident Engineer as different colors may be selected for each face.
- G. Paint items fitted with finish hardware after hardware has been temporarily removed.
- H. Heating and other equipment on or adjacent to walls or surfaces scheduled for painting, shall be disconnected, using workmen skilled in appropriate trades and moved temporarily to permit painting of surface. Following completion of painting, replace and reconnect items.
- I. Each succeeding pigmented coat shall be distinguishably lighter than the previous coat. Tint prime and undercoats to a color similar to finish coat. Each coat of material applied must be inspected and approved by the Architect and Resident Engineer before the application of the succeeding specified coat; otherwise no credit for the concealed coat will be given, and the Contractor shall assume the responsibility to recoat work in question. Contractor shall notify the Architect and Resident Engineer when each coat is completed.
- J. Brush, wipe or roll stain in 2 coat application. Avoid lap marks by maintaining "wet-edge" continually being merged with existing liquid coverage and stop only at natural edges, turns and breaking places.
- K. Do not paint over Underwriters' Laboratory labels, fusible links, exposed sprinkler heads and other similar items.
- L. Paint piping, electrical or other equipment, conduit, vents and other similar items, on roof or other exterior locations as directed by Architect and Resident Engineer.
- M. Finish closets and the interior of cabinets with same color as adjoining rooms, unless otherwise specified. Finish other surfaces same as nearest or adjoining surfaces, unless otherwise shown or scheduled.
- N. Paint surface of walls which will be concealed by cabinets, chalkboards and other items attached to wall.

3.6 APPLICATION - PER PAINT MATERIAL TYPE

- A. Water-Based Latex paint - Low-VOC: Comply with manufacturer's recommendations for application; may be applied by brush, roller, or sprayer.
- B. Oil-Based Paint - Low-VOC: Comply with manufacturer's recommendations for application; sand lightly between coats and apply by brush or roller.
- C. Recycled Latex Paint: Comply with manufacturer's recommendations for application; may be applied by brush, roller, or sprayer. Typically applied as primer, because colors not consistent.
- D. Low-Biocide Paint: Because of reduced shelf life, these products should be carefully evaluated for spoilage before applying. Comply with manufacturer's recommendations for application; may be applied by brush, roller, or sprayer.
- E. Natural Plant- and Mineral-Based Finishes: These products do not necessarily perform or behave the same as conventional paints. They may require more coats or longer drying time. Comply with manufacturer's recommendations for application.
- F. Milk-Based Paint (Casein): Available in powdered form. Add water and stir well. Transparency may be controlled by the amount of water added. In powder form it has an indefinite shelf life. May be applied by brush, roller, or sprayer. After mixing, do not keep beyond recommended shelf life (to avoid spoilage).
- G. Urethanes - Water Emulsion: May be applied by brush, roller, or sprayer. Sand between coats; raises grain significantly.
- H. Penetrating Oil Finishes: Apply three coats, one per day with a brush or cloth. Allow to set, wipe dry, and buff. Comply with manufacturer's recommendations for application. Do not apply when temperature is below 65°F.
- I. Paint Strippers - Low-Emitting: Paint strippers that do not contain methylene chloride tend to be slower acting than conventional paint strippers and may take from one hour to overnight to work. Comply with manufacturer's recommendations for application. Use appropriate protection: impermeable gloves, respirators, goggles.

3.7 INDOOR AIR QUALITY

- A. Applicators shall wear protective clothing and respirators when applying oil-based paints or using spray equipment with any paints.
- B. Maximize ventilation during application and drying.
- C. Isolate area of application from rest of building.
- D. Vacate space for as long as possible after application. Wait a minimum of 48 hours before occupying freshly painted rooms.

3.8 WASTE MANAGEMENT

- A. Separate waste in accordance with the Waste Management Plan. Set aside extra paint for future color matches, or reuse by Owner, school theater sets, Habitat for Humanity, etc. Where local options exist for left-over paint recycling, collect all waste paint by type and provide for delivery to recycling or collection facility.

- B. Close and seal tightly all partly used paint and finish containers and store protected in well-ventilated, fire-safe area at moderate temperature.
- C. Place empty containers of solvent-based paints in areas designated for hazardous materials.
- D. Do not dispose of paints or solvents by pouring on the ground. Place in designated containers for proper disposal.
- E. Construction Waste: In accordance with Section 01 74 19.

3.9 ADJUSTING

- A. At completion, do touch-up and re-paint work and leave finish surfaces in good condition.

3.10 CLEANING

- A. During the course of the Work, remove misplaced paint and stain spots or spills. Leave Work in clean condition acceptable to Architect and Resident Engineer.
- B. Remove oily rags and waste daily, taking precaution to prevent fire.
- C. Water Pollution Control: In accordance with Greenbook/Whitebook requirements.
- D. Storm Water Control: In accordance with Greenbook/Whitebook requirements, Section 7-8.6.
- E. Environment Protection: In accordance with Greenbook/Whitebook requirements, Section 7-8.6.

3.11 SCHEDULES

- A. Color Schedule:
 1. Architect and Resident Engineer will provide a complete schedule of colors. Colors may be selected from various manufacturer's color palettes. Manufacturer supplying paint shall match these colors. Contractor shall prepare duplicate set of samples of treatments for major surfaces. If a specific surface or item receiving a paint finish does not have a specific color indicated or selected by the Architect and Resident Engineer, obtain clarification from the Architect and Resident Engineer. Do not assume the confirmation of the same color on the adjacent surfaces.
 2. Final coat of paint shall be not be applied until colors have been approved by the Architect and Resident Engineer.
- B. Schedule of Finishes: Refer to the "Finish Legend" on the Drawing for designated finishes of areas.
- C. Finishing of the following listed items and materials will not be required and shall be protected:
 1. Stainless Steel, brass, bronze, copper, monel, chromium, anodized aluminum; specially finished articles such as porcelain enamel, plastic coated fabrics, and baked enamel, unless otherwise indicated.
 2. Finished products such as ceramic tile, glass, brick, resilient flooring and acoustical tiles, board and metal tees.
 3. Pre-finished products such as wood folding partitions and doors, wood classroom and laboratory casework, bleachers and elevator cabs.

3.12 PAINTING SCHEDULE -EXTERIOR

Sherman Williams or Equal

A. Exterior Acrylic:

1. Plaster (P7 - Wainscot):

1st Coat: Hopsack SW 6109
2nd Coat: Hopsack SW 6109 Plaster

(P8):

1st Coat: Kilim Beige SW 6106
2nd Coat: Kilim Beige SW 6106

2. Concrete:

1st Coat: Hopsack SW 6109 2nd
Coat: Hopsack SW 6109
3rd Coat: Hopsack SW 6109

3. Concrete Block (where indicated to be painted):

1st Coat: 1010 Block Primer
2nd Coat: Hopsack SW 6109
3rd Coat: Hopsack SW 6109

4. Powdercoat:

5. Ferrous Metal: (P9 – Powdercoat)

1st Coat: Fire Engine Red
2nd Coat: Fire Engine Red
3rd Coat: Fire Engine Red

B. Semi-Gloss Finish:

1. Galvanized Metal: (P6 - Clerestory, Trellises, Arbor) Pretreat:

7113 Vinyl Wash
1st Coat: Leather Bound SW 6118
2nd Coat: Leather Bound SW 6118
3rd Coat: Leather Bound SW 6118

C. Integral Color Plaster:

1. Plaster: (PL1)

Integral Color: Beige – smooth texture

2. Plaster: (PL2)

Integral Color: Brown – Medium Machine Dash texture

3.13 PAINTING SCHEDULE -INTERIOR

A. Flat Finish:

1. Gypsum Board: (P1) Walls

1st Coat: Ivoire SW 6127

2nd Coat: Ivoire SW 6127

2. Gypsum Board: (P2) Ceilings

1st Coat: Navajo White SW 6126

2nd Coat: Navajo White SW 6126

B. Semi-Gloss Enamel Finish:

1. Gypsum Board: (P3) Walls

1st Coat: Ivoire SW 6127

2nd Coat: Ivoire SW 6127

2. Gypsum Board: (P4) Ceilings

1st Coat: Navajo White SW 6126

2nd Coat: Navajo White SW 6126

3. Metal: (P5) Structural Steel, Metal Deck 1st

Coat:

2nd Coat: 3rd Coat:

END OF SECTION

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SECTION 09 91 13
EXTERIOR PAINTING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on exterior substrates.
- B. Surface preparation and field painting of exposed items and surfaces.
 - 1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
 - 2. Field finish coating of shop or factory primed and prefinished items. Refer to individual Sections for priming requirements.
 - 3. Finish coatings schedule.
 - 4. Preparation work and coatings specified in this Section are in addition to shop and factory applied finishes and surface treatment specified in other Sections.
 - 5. Paint all other items unless specifically indicated not to be painted.
 - 6. Color schedule.
- C. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
 - 1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.
- D. Related Requirements:
 - 1. Section 018113 - Sustainable Design Requirements for CAL-Green submittal requirements.

1.2 DEFINITIONS

- A. Conform to PDCA Glossary for interpretation of terms used in this Section except as modified below.
- B. Exposed Surfaces: Surfaces of products, assemblies, and components visible from any angle after final installation. Includes internal surfaces visible when operable doors, panels or drawers are open, and surfaces visible behind registers, grilles, or louvers.
- C. Concealed Surfaces: Surfaces permanently hidden from view in finished construction and which are only visible after removal or disassembly of part or all of product or assembly.
- D. Inaccessible Spaces: Spaces not intended for human use.
 - 1. Standard terms used by the coatings industry are defined in ASTM D 16.
- E. Gloss Levels
 - 1. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
 - 2. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
 - 3. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
 - 4. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
 - 5. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
 - 6. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
 - 7. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

F. System DFT: Dry film thickness of entire coating system unless otherwise noted.

1.3 SUBMITTALS

- A. Product Data: For each paint system indicated. Include block fillers and primers.
 - 1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - 2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Submit Samples on rigid backing, 8 inches square.
- D. Step coats on Samples to show each coat required for system.
- E. Label each coat of each Sample.
- F. Label each Sample for location and application area.
- G. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
- H. VOC content.
- I. Certifications specified in Quality Assurance article.
- J. Qualification Data: Applicator's qualification data.
- K. Manufacturer's instructions.
- L. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
- M. Paint: 5 percent, but not less than 1 gallon of each material and color applied.

1.4 SUSTAINABILITY SUBMITTALS

- A. LEED Submittals: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
 - 1. Product Data for Credit MR 4.1 and MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
 - 2. Product Certificates for Credit MR 5.1 and MR 5.2: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
 - a. Include statement indicating distance from manufacturer to Project for each regionally manufactured material.
 - b. Include statement indicating location of and distance from Project to point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials.
 - 3. LEED Credit EQ 4.2: Product data for paints and coatings used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.
- B. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green for the following measures:
 - 1. 4.504.2.2 and 5.504.4.3 Paints and coatings.

2. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.

1.5 QUALITY ASSURANCE

- A. Field Samples: Apply field 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 field samples.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 3. Approval of field samples does not constitute approval of deviations from the Contract Documents contained in field samples unless Architect specifically approves such deviations in writing.
 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- B. Mockups: Apply mockups 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. (9 sq.m).
 - b. Other Items: Architect will designate items or areas required.
 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- C. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
 1. Add other requirements to suit Project.
 2. Product name or title of material.
 3. Product description (generic classification or binder type).
 4. Manufacturer's stock number and date of manufacture.
 5. Contents by volume, for pigment and vehicle constituents.
 6. Thinning instructions.
 7. Application instructions.
 8. Color name and number.
 9. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.7 FIELD CONDITIONS

- A. Environmental Conditions: Comply with more restrictive of following or manufacturer's requirements under which systems can be applied.
 - 1. Provide illumination of not less than 80 footcandles measured mid-height at substrate surface during application of coatings.
 - 2. Apply water reducible coatings only when ambient and surface temperatures are between 50 degrees F and 90 degrees F.
 - 3. Apply solvent reducible coatings only when ambient and surface temperatures are between 45 degrees F and 90 degrees F.
 - 4. Do not apply coatings under any of following conditions:
 - a. When surfaces are damp or wet.
 - b. During [snow,]rain, fog, or mist.
 - c. When relative humidity is less than 20 percent or exceeds 85 percent.
 - d. When temperature is less than 5 degrees F above dew point.
 - e. When dust may be generated before coatings have dried.
 - f. In direct sunlight.
 - g. When wind velocity is above 20 mph.
 - 5. Application of coatings may continue during inclement weather provided work areas and surfaces to be coated are enclosed and specified environmental conditions are maintained.

1.8 WARRANTY

- A. Warrant installation to be free from defects in material and workmanship for 5 years.
- B. Repair or replace defects occurring during warranty period.
 - 1. Defects include but are not limited to pinholes, crazing or cracking, loss of adhesion to substrate, deficient thickness, improper materials and workmanship.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers:
 - 1. Sherwin-Williams Company (The).
 - 2. Dunn-Edwards Corporation.
 - 3. Benjamin Moore & Co .
 - 4. Glidden Professional.
 - 5. PPG Industries
 - 6. Vista Paint.
 - 7. Tnemec.

2.2 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. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
- C. Coatings:
 - 1. Ready-mixed, factory tinted, best professional grade produced by manufacturer.
 - 2. Use manufacturer's appropriate base materials to achieve required colors.

3. Fully grind pigments to maintain soft paste consistency in vehicle.
 4. Capable of being dispersed into uniform, homogeneous mixture.
 5. Possess good flowing and brushing properties.
 6. Capable of drying or curing free of streaks or sags, and yielding specified finish.
- D. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.
- E. Low-Emitting Materials: Interior paints and coatings 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."
- F. Paint Maximum Product Emissions Limits: Top coat and primer interior paints must meet or not exceed the VOC (Volatile Organic Compounds) limits of the current requirements of Green Seal Standards GS-11 - Paints in the building, and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.
1. Cal-GREEN Requirements for typical paint coatings:
 - a. Primers, Sealers, and Undercoaters: 100 grams per liter of product minus water
 - b. Flats: 50 grams per liter of product minus water
 - c. Non-flats: 100 grams per liter of product minus water
 - d. Non-flat High Gloss: 150 grams per liter of product minus water
 - e. Dry-Fog Coatings: 150 g/L.
 - f. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 - g. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 - h. Floor Coatings: 100 g/L.
 - i. Shellacs, Clear: 730 g/L.
 - j. Shellacs, Pigmented: 550 g/L.
- G. Colors: As indicated in a color schedule.

2.3 BLOCK FILLERS

- A. Block Filler, Latex, Interior/Exterior: Factory-formulated interior and exterior concrete block filler PDCA Level 2.
1. Sherwin-Williams: Prep-Rite Block Filler B25W25.
 2. Dunn-Edwards Corporation; SBSL00 Smooth Blocfil Select, Interior / Exterior Concrete Block Filler.
 3. Benjamin Moore and Company: Super Spec Masonry Int/Ext HI-Build Block Filler206. Applied at a dry film thickness of not less than 8.5 mil.
 4. Glidden Professional; Concrete Coatings Block Filler GP3010
 5. Vista Paint Corporation: 4600 Uniprime II at a dry film thickness of not less than 2.0mil.
 6. Tnemec; Series 130 Envirofill

2.4 PRIMERS/SEALERS

- A. Exterior Concrete and Masonry Primer: Factory-formulated alkali-resistant acrylic-latex primer for exterior application.
1. Sherwin-Williams; Loxon Concrete & Masonry Primer A24W08300: Applied at a dry film thickness of not less than 3.0 mils.
 2. Dunn-Edwards Corporation; ESPR00 Eff-Stop Premium Interior / Exterior 100% Acrylic Masonry Primer / Sealer: Applied at a dry film thickness of not less than 1.5mils.
 3. Benjamin Moore and Company: Fresh Start All Purpose 100% Acrylic Primer #023. Applied at a dry film thickness of not less than 1.2 mil.
 4. Glidden Professional; GP6001 Hydrosealer Primer Sealer: Applied at a dry film thickness of not less than 1.4 mils.
 5. Vista Paint Corporation: 4600 Uniprime II at a dry film thickness of not less than 2.0mil.
 6. Tnemec; Series 180 W.B. Tnemec-Crete. Applied at a dry film thickness rate of not less than 4.0 mils.

- B. Exterior Gypsum Soffit Board Primer: Factory-formulated alkyd- or alkali-resistant acrylic-latex primer for exterior application.
 - 1. Benjamin Moore and Company: Fresh Start All Purpose Alkyd Primer #204. Applied at a dry film thickness of not less than 1.8 mil.
 - 2. Dunn-Edwards Corporation; UGPR00-1 Ultra-Grip Premium, Ultra-Low VOC, Interior/ Exterior Acrylic Multi-Surface Primer: Applied at a dry film thickness of not less than 1.5mils.
 - 3. Glidden Professional; 3210 Gripper Interior/Exterior Primer Sealer: Applied at a dryfilm thickness of not less than 1.8 mils.
 - 4. Sherwin-Williams; : Exterior Latex Wood Primer, B42W0841Applied at a dry film thickness of not less than 1.4 mils.
 - 5. Tnemec; Series 180 W.B. Tneme-Crete. Applied at a dry film thickness rate of not less than 4.0 mils.
 - 6. Vista Paint Corporation: 4600 Uniprime II at a dry film thickness of not less than 2.0mil.

- C. Exterior Ferrous-Metal Primer: Factory-formulated rust-inhibitive metal primer forexterior application.
 - 1. Benjamin Moore and Company: Super Spec HP Acrylic Metal Primer #P04. Applied at a dry film thickness of not less than 1.7 mil.
 - 2. Dunn-Edwards Corporation; BRPR00-1 Bloc-Rust Premium, Interior / Exterior, Red Oxide or White, Waterborne Alkyd Rust Preventative Metal Primer: Applied at a dry film thickness of not less than 2.0 mils
 - 3. Glidden Professional; 4160-XXXX Devguard Multi-Purpose Tank & Structural Primer. Applied at a dry film thickness of not less than 2.0 mils.
 - 4. PPG Industries; Speedhide Alkyd Metal Primer 6-208. Applied at a dry film thickness of not less than 2.3 mils or Water Based option; Pitt Tech Plus DTM Acrylic Primer 90-912 Applied at a dry film thickness of not less than 2.0 mils.
 - 5. Sherwin-Williams; Kem Kromik Universal Metal Primer B50NZ6/B50WZ1: Applied at a dry film thickness of not less than 3.0 mils If a waterbased primer is desired, use S-WPro Industrial ProCryl Universal Acrylic Primer, B66W310. Applied at a dry film thickness of not less than 3.0 mils.
 - 6. Tnemec; Series 115 Uni-Bond DF. Applied at a dry film thickness rate of not less than 3.0 mils DFT.
 - 7. Vista Paint Corporation: 4600 Uniprime II at a dry film thickness of not less than 2.0mil.

- D. Exterior Galvanized Metal Primer: Factory-formulated galvanized metal primer for exterior application.
 - 1. Benjamin Moore and Company: Super Spec HP Acrylic Metal Primer #P04. Applied at a dry film thickness of not less than 1.7 mil.
 - 2. Dunn-Edwards Corporation; UGPR00-1 Ultra-Grip Premium, Ultra-Low VOC, Interior/ Exterior Acrylic Multi-Surface Primer: Applied at a dry film thickness of not less than 1.5mils.
 - 3. Glidden Professional; 4020-XXXX Devflex DTM Flat Interior/Exterior Waterborne Primer & Finish: Applied at a dry film thickness of not less than 2.2 mils.
 - 4. Kelly-Moore; 5725 DTM-Acrylic Metal Primer: Applied at a dry film thickness of not less than 1.8 mils.
 - 5. PPG Industries; Pitt Tech Plus DTM Acrylic Primer 90-912 Applied at a dry film thickness of not less than 2.0 mils.
 - 6. Sherwin-Williams; S-W Pro Industrial ProCryl Universal Acrylic Primer, B66W310. Applied at a dry film thickness of not less than 3.0 mils.
 - 7. Tnemec:
 - a. Under Acrylics: Series 115 Uni-Bond DF; Applied at a dry film thickness rate of not less than 3.0 mils.
 - 8. Vista Paint Corporation: 4600 Uniprime II at a dry film thickness of not less than 2.0mil.

2.5 WATER-BASED PAINTS

- A. Exterior Flat Acrylic Paint: Factory-formulated flat acrylic-emulsion latex paint for exterior application.

1. Benjamin Moore and Company: Ultra Spec EXT Flat Finish N447. Applied at a dry film thickness of not less than 1.5 mil.
 2. Dunn-Edwards Corporation; SSSL10 Spartashield Exterior, Ultra-Low VOC, 100% Acrylic Exterior Flat Paint: Applied at a dry film thickness of not less than 1.5 mils.
 3. Glidden Professional; 2210-XXXX Ultra-Hide 150 Exterior 100 Percent Acrylic Flat Finish: Applied at a dry film thickness of not less than 1.4 mils.
 4. PPG Industries; Speedhide Exterior 100% Acrylic Flat Latex 6-610XI Series. Applied at a dry film thickness of not less than 1.5 mils
 5. Sherwin-Williams; A-100 Exterior Latex Flat A6 Series: Applied at a dry film thickness of not less than 1.3 mils.
 6. Tnemec; Series 180 W.B. Tneme-Crete; Applied at a dry film thickness rate of not less than 4.0 mils.
 7. Vista Paint Corporation: 4600 Uniprime II at a dry film thickness of not less than 2.0mil.
- B. Exterior Low-Luster Acrylic Paint: Factory-formulated low-sheen (eggshell) acrylic-latex paint for exterior application.
1. Benjamin Moore and Company: Ultra Spec EXT Satin Finish N448. Applied at a dry film thickness of not less than 1.5 mil.
 2. Dunn-Edwards Corporation; SSSL40 Spartashield Exterior, Ultra-Low VOC, 100% Acrylic Low Sheen Paint: Applied at a dry film thickness of not less than 1.5 mils.
 3. Glidden Professional; 2412-XXXX Dulux Professional Exterior 100 Percent Acrylic Satin Finish: Applied at a dry film thickness of not less than 1.4 mils.
 4. PPG Industries; Speedhide Exterior 100% Acrylic Satin Latex 6-2045XI Series. Applied at a dry film thickness of not less than 1.5 mils.
 5. Sherwin-Williams; A-100 Exterior Latex Satin A82 Series: Applied at a dry film thickness of not less than 1.5 mils.
 6. Tnemec; Series 1029 Enduratone; Applied at a dry film thickness rate of not less than 2.0 mils.
 7. Vista Paint Corporation: 4600 Uniprime II at a dry film thickness of not less than 2.0mil.
- C. Exterior Semigloss Acrylic Enamel: Factory-formulated semigloss waterborne acrylic-latex enamel for exterior application.
1. Benjamin Moore and Company: Ultra Spec EXT Gloss Finish N449. Applied at a dry film thickness of not less than 1.5 mil.
 2. Dunn-Edwards Corporation; SSSL50 Spartashield Exterior, Ultra-Low, 100% Acrylic Semi-Gloss Paint: Applied at a dry film thickness of not less than 1.5 mils.
 3. Glidden Professional; 2416-XXXX Ultra Hide 150 Exterior 100 Percent Acrylic Semi-Gloss Finish: Applied at a dry film thickness of not less than 1.6 mils.
 4. PPG Industries; Speedhide Exterior 100% Acrylic Semi-Gloss Latex 6-900XI Series. Applied at a dry film thickness of not less than 1.5 mils.
 5. Sherwin-Williams; A-100 Latex Gloss A8 Series: Applied at a dry film thickness of not less than 1.3 mils.
 6. Tnemec; Series 1029 Enduratone; Applied at a dry film thickness rate of not less than 2.0 mils.
 7. Vista Paint Corporation: 4600 Uniprime II at a dry film thickness of not less than 2.0mil.
- D. Exterior Full-Gloss Acrylic Enamel for Ferrous and Other Metals: Factory-formulated full-gloss waterborne acrylic-latex enamel for exterior application.
1. Benjamin Moore and Company: Ultra Spec EXT Gloss Finish N449. Applied at a dry film thickness of not less than 1.5 mil.
 2. Dunn-Edwards Corporation; SSSL60 Spartashield Interior and Exterior, Ultra-Low, 100% Acrylic Gloss Paint: Applied at a dry film thickness of not less than 1.5 mils.
 3. Glidden Professional; 4208 Series DevFlex Interior/Exterior Acrylic Gloss Finish: Applied at a dry film thickness of not less than 1.6 mils.
 4. PPG Industries; Manor Hall Interior Exterior 100% Acrylic Gloss 52-110 Series. Applied at a dry film thickness of not less than 1.6 mils.

5. Sherwin-Williams; S-W SOLO 100% Acrylic Interior/Exterior Gloss, A77W00051 Applied at a dry film thickness of not less than 1.6 mils.
6. Themec; Series 1028 Enduratone; Applied at a dry film thickness rate of not less than 2.0.
7. Vista Paint Corporation: 4600 Uniprime II at a dry film thickness of not less than 2.0 mil.

2.6 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
 1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 2. Testing agency will perform tests for compliance with product requirements.
 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application. Comply with procedures specified in PDCAP4.
 1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.
- C. 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. Portland Cement Plaster: 12 percent.
 5. Gypsum Board: 12 percent.
- D. Portland Cement Plaster Substrates: Verify that plaster is fully cured.
- E. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- F. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- G. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.

- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
- D. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- E. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- F. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- G. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer[.] [but not less than the following:]
- H. SSPC-SP 2, "Hand Tool Cleaning."
- I. SSPC-SP 3, "Power Tool Cleaning."
- J. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
- K. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
- L. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- M. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- N. Wood Substrates:
 - 1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- O. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
- B. Use applicators and techniques suited for paint and substrate indicated.
- C. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
- D. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
- E. Paint entire exposed surface of window frames and sashes.

- F. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- G. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- H. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- I. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- J. 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.
- K. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
- L. Paint the following work where exposed to view:
- M. Equipment, including panelboards .
- N. Uninsulated metal piping.
- O. Uninsulated plastic piping.
- P. Pipe hangers and supports.
- Q. Metal conduit.
- R. Plastic conduit.
- S. Tanks that do not have factory-applied final finishes.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. 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.
- D. Provide "Wet Paint" signs and other methods to protect newly coated surfaces. Remove when directed or when no longer needed.
- E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

- A. Concrete Substrates, Nontraffic Surfaces:
 - 1. Latex System:
 - a. Prime Coat: Latex, exterior, matching topcoat.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4).
- B. CMU Substrates:
 - 1. Latex System:
 - a. Prime Coat: Block filler, latex, interior/exterior.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4).
 - d. Topcoat: Latex, exterior gloss (Gloss Level 6).
- C. Steel Substrates:
 - 1. High-Performance Architectural Latex System:
 - a. Prime Coat: Shop primer specified in Section where substrate is specified.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3).
- D. Galvanized-Metal Substrates:
 - 1. Latex System:
 - a. Prime Coat: Primer, galvanized metal, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4).
- E. Portland Cement Plaster Substrates:
 - 1. Latex over Alkali-Resistant Primer System:
 - a. Prime Coat: Primer, alkali resistant, water based.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior flat (Gloss Level 1).
- F. Exterior Gypsum Board Substrates:
 - 1. Latex System:
 - a. Prime Coat: Latex, exterior, matching topcoat.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4).

END OF SECTION

SECTION 09 91 23
INTERIOR PAINTING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on interior substrates.
- B. Surface preparation and field painting of exposed items and surfaces.
 - 1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
 - 2. Field finish coating of shop or factory primed and prefinished items. Refer to individual Sections for priming requirements.
 - 3. Finish coatings schedule.
 - 4. Preparation work and coatings specified in this Section are in addition to shop and factory applied finishes and surface treatment specified in other Sections.
 - 5. Paint all other items unless specifically indicated not to be painted.
 - 6. Color schedule.
- C. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
 - 1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.
- D. This Project is a US Green Building Council LEED – NC project.
 - 1. Low-Emitting Materials: Reduce the quantity of indoor air contaminants that are odorous or potentially irritating to provide installer and occupant health and comfort.
 - 2. Paints and Coatings must meet or exceed the VOC and chemical component limits of Green Seal requirements.
 - 3. Select locally or regionally fabricated products (within 500 miles of jobsite) wherever possible.
 - 4. Use coatings that comply with the more stringent VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and Cal GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.

1.2 RELATED REQUIREMENTS:

- A. Section 099113 - Exterior Painting for surface preparation and the application of paint systems on exterior substrates.
- B. Division 21 – Fire Suppression: Piping identification.
- C. Division 22 – Plumbing: Piping identification.
- D. Division 23 – Heating, Ventilating, and Air Conditioning: Mechanical identification.
- E. Division 26 – Electrical: Electrical identification.

1.3 DEFINITIONS

- A. Conform to PDCA Glossary for interpretation of terms used in this Section except as modified below.
- B. Exposed Surfaces: Surfaces of products, assemblies, and components visible from any angle after final installation. Includes internal surfaces visible when operable doors, panels or drawers are open, and surfaces visible behind registers, grilles, or louvers.

- C. Concealed Surfaces: Surfaces permanently hidden from view in finished construction and which are only visible after removal or disassembly of part or all of product or assembly.
- D. Inaccessible Spaces: Spaces not intended for human use.
 - 1. Standard terms used by the coatings industry are defined in ASTM D 16.
- E. Gloss Levels
 - 1. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
 - 2. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
 - 3. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
 - 4. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
 - 5. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
 - 6. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
 - 7. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.
- F. System DFT: Dry film thickness of entire coating system unless otherwise noted.

1.4 SUBMITTALS

- A. Product Data: For each paint system indicated. Include block fillers and primers.
 - 1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - 2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches (200 mm) square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. VOC content.
- E. Certifications specified in Quality Assurance article.
- F. Qualification Data: Applicator's qualification data.
- G. Manufacturer's instructions.
- H. Furnish extra materials[, from the same product run,] that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 SUSTAINABILITY SUBMITTALS

- A. LEED Submittals: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
 - 1. Product Certificates for Credit MR 5.1 and MR 5.2: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include

- statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
 - a. Include statement indicating distance from manufacturer to Project for each regionally manufactured material.
 - b. Include statement indicating location of and distance from Project to point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials.
 - 2. LEED Credit EQ 4.2: Product data for paints and coatings used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.
- B. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements – CAL-Green, for the following measures:
- 1. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 2. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.

1.6 QUALITY ASSURANCE

- A. Field Samples: Apply field 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 field samples.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of field samples does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- B. Mockups: Apply mockups 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. (9 sq.m).
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
- 1. Add other requirements to suit Project.
 - 2. Product name or title of material.
 - 3. Product description (generic classification or binder type).
 - 4. Manufacturer's stock number and date of manufacture.

5. Contents by volume, for pigment and vehicle constituents.
6. Thinning instructions.
7. Application instructions.
8. Color name and number.
9. VOC content.

- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.8 FIELD CONDITIONS

- A. Environmental Conditions: Comply with more restrictive of following or manufacturer's requirements under which systems can be applied.
 1. Provide continuous ventilation during application of coatings to exhaust hazardous fumes.
 2. Provide heating necessary to maintain surface and ambient temperatures within specified limits.
 3. Maintain temperature and humidity conditions for minimum 24 hours before, during, and 48 hours after application of finishes, unless longer times are required by manufacturer.
 4. Do not permit wide variations in ambient temperatures which might result in condensation on freshly coated surfaces.
 5. Provide illumination of not less than 80 footcandles measured mid-height at substrate surface during application of coatings.
 6. Apply water reducible coatings only when ambient and surface temperatures are between 50 degrees F and 90 degrees F.
 7. Apply solvent reducible coatings only when ambient and surface temperatures are between 45 degrees F and 90 degrees F.
 8. Do not apply coatings under any of following conditions:
 - a. When surfaces are damp or wet.
 - b. During snow, rain, fog, or mist.
 - c. When relative humidity is less than 20 percent or exceeds 85 percent.
 - d. When temperature is less than 5 degrees F above dew point.
 - e. When dust may be generated before coatings have dried.
 - f. In direct sunlight.
 - g. When wind velocity is above 20 mph.
 9. Application of coatings may continue during inclement weather provided work areas and surfaces to be coated are enclosed and specified environmental conditions are maintained.

1.9 WARRANTY

- A. Warrant installation to be free from defects in material and workmanship for 5 years.
- B. Repair or replace defects occurring during warranty period.
 1. Defects include but are not limited to pinholes, crazing or cracking, loss of adhesion to substrate, deficient thickness, improper materials and workmanship.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Sherwin-Williams Company (The).
 2. Dunn-Edwards Corporation.
 3. Benjamin Moore & Co.
 4. Glidden Professional.
 5. PPG Industries.

6. Vista Paint.

2.2 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. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

C. Coatings:

1. Ready-mixed, factory tinted, best professional grade produced by manufacturer.
2. Use manufacturer's appropriate base materials to achieve required colors.
3. Fully grind pigments to maintain soft paste consistency in vehicle.
4. Capable of being dispersed into uniform, homogeneous mixture.
5. Possess good flowing and brushing properties.
6. Capable of drying or curing free of streaks or sags, and yielding specified finish.
7. VOC content of field applied coatings shall comply with local governing authorities.

D. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction[and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Dry-Fog Coatings: 400 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings: 100 g/L.
9. Shellacs, Clear: 730 g/L.
10. Shellacs, Pigmented: 550 g/L.

E. Low-Emitting Materials: Interior paints and coatings 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."

F. Paint Maximum Product Emissions Limits: Top coat and primer interior paints must meet or not exceed the VOC (Volatile Organic Compounds) limits of the current requirements of Green Seal Standards GS-11 - Paints in the building, and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.

1. Cal-GREEN Requirements for typical paint coatings:
 - a. Primers, Sealers, and Undercoaters: 100 grams per liter of product minus water
 - b. Flats: 50 grams per liter of product minus water
 - c. Non-flats: 100 grams per liter of product minus water
 - d. Non-flat High Gloss: 150 grams per liter of product minus water
 - e. Dry-Fog Coatings: 150 g/L.
 - f. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 - g. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 - h. Floor Coatings: 100 g/L.
 - i. Shellacs, Clear: 730 g/L.

j. Shellacs, Pigmented: 550 g/L.

G. Colors: As indicated in a color schedule.

2.3 BLOCK FILLERS

A. Interior Concrete Block Filler: Factory-formulated interior and exterior concrete block filler. PDCA Level 2.

1. Sherwin-Williams: Prep-Rite Block Filler B25W25.
2. Dunn-Edwards Corporation; SBSL00 Smooth Blocfil Select, Interior / Exterior Concrete Block Filler:
3. Benjamin Moore and Company: Super Spec Masonry Int/Ext HI-Build Block Filler 206. Applied at a dry film thickness of not less than 8.5 mil.
4. Glidden Professional; Concrete Coating Block Filler GP3010
5. PPG Industries; Speedhide Interior Exterior Latex Block Filler 6-7
6. Vista Paint Corporation: 040 Block Kote Applied at a dry film thickness of not less than 8.4 mil.

2.4 PRIMERS/SEALERS

A. Interior Gypsum Board Primer: Factory-formulated latex-based primer for interior application.

1. Sherwin-Williams; S-W ProMar 200 Zero VOC Primer, B28W02600. Applied at a dry film thickness of not less than 1.0 mil.
1. Dunn-Edwards Corporation; VNSL00-1 Vinylastic Select Low Odor / Zero VOC Interior Wall Sealer: Applied at a dry film thickness of not less than 1.5 mils.
2. Benjamin Moore and Company: Ultra Spec 500 Interior Latex Primer #N534. Applied at a dry film thickness of not less than 1.8 mil.
3. Glidden Professional; GP9116 Lifemaster No VOC Interior Primer Sealer Applied at a dry film thickness of not less than 1.4 mils.
4. Glidden Professional; 1030-1200 PVA Interior Primer Sealer General Purpose Wall Primer: Applied at a dry film thickness of not less than 1.2 mils.
5. PPG Industries; Speedhide zero Interior Latex Primer/Sealer 6-4900XI. Applied at a dry film thickness of not less than 1.4 mils
6. Vista Paint Corporation: 5001 V-Pro Zero VOC Primer Applied at a dry film thickness of not less than 1.2 mil.

B. Interior Wood Primer for Acrylic-Enamel and Semigloss Alkyd-Enamel Finishes: Factory-formulated alkyd- or acrylic-latex-based interior wood primer.

1. Sherwin-Williams; Premium Wall and Wood Primer B28W08111 Series: Applied at a dry film thickness of not less than 1.6 mils.
1. Dunn-Edwards Corporation; Dunn-Edwards Corporation; IKPR00-1 Inter-Kote Premium Low Odor / Zero VOC Interior Undercoater: Applied at a dry film thickness of not less than 1.5 mils.
2. Benjamin Moore and Company: Ultra Spec 500 Interior Latex Primer #N534. Applied at a dry film thickness of not less than 1.8 mil.
3. Glidden Professional; GP9116 Lifemaster No VOC Interior Primer Sealer Applied at a dry film thickness of not less than 1.4 mils.
4. Vista Paint Corporation: 5001 V-Pro Zero VOC Primer Applied at a dry film thickness of not less than 1.2 mil.

C. Interior Ferrous-Metal Primer: Factory-formulated quick-drying rust-inhibitive alkyd-based metal primer.

1. Sherwin-Williams; Kem Kromik Universal Metal Primer B50NZ6/B50WZ1: Applied at a dry film thickness of not less than 3.0 mils.
2. Dunn-Edwards Corporation; BRPR00-1 Bloc-Rust Premium, Ultra Low VOC, Interior / Exterior, Red Oxide or White, Waterborne Alkyd Rust Preventative Metal Primer: Applied at a dry film thickness of not less than 2.0 mils.

3. Dunn-Edwards Corporation; ULDM00 Ultrashield, Low Odor / Zero VOC, Interior /Exterior DTM Gray Primer: Applied at a dry film thickness of not less than 2.0mils.
 4. Benjamin Moore and Company: Super Spec HP Alkyd Metal Primer #P06. Applied at a dry film thickness of not less than 1.7 mil.
 5. Glidden Professional; 4020-XXXX Devflex DTM Flat Interior/Exterior Waterborne Primer & Finish: Applied at a dry film thickness of not less than 2.2 mils.
 6. PPG Industries; Pitt Tech Plus DTM Acrylic Primer 90-912. Applied at a dry film thickness of not less than 2.0 mils.
 7. Vista Paint Corporation: 9600 Protec Metal Primer. Applied at a dry film thickness of not less than 2.0 mil.
- D. Interior Zinc-Coated Metal Primer: Factory-formulated galvanized metal primer.
1. Sherwin-Williams: Pro-Cryl universal primer/finish, B66-310. Applied at a dry film thickness of not less than 3.0 mils.
 2. Dunn-Edwards Corporation; UGSL00-1 Ultra-Grip Select, Low Odor / Zero VOC, Interior / Exterior Acrylic Multi-Surface Primer: Applied at a dry film thickness of not less than 1.5mils.
 3. Benjamin Moore and Company: Super Spec HP Acrylic Metal Primer #P04. Applied at a dry film thickness of not less than 1.7 mils.
 4. Glidden Professional 4020-XXXX Devflex DTM Flat Interior/Exterior Waterborne Primer & Finish: Applied at a dry film thickness of not less than 2.2 mils.
 5. PPG Industries; Pitt Tech Plus DTM Acrylic Primer 90-912. Applied at a dry film thickness of not less than 2.0 mils
 6. Vista Paint Corporation: 4800 Metal Pro Primer Applied at a dry film thickness of not less than 1.2 mil.

2.2 FINISH COATS

- A. High-Performance Architectural Latex System - Flat Acrylic Paint: Factory-formulated flat acrylic-emulsion latex paint for interior application.
1. Sherwin-Williams; S-W ProMar 200 Zero VOC Flat, B30W02651. Applied at a dry film thickness of not less than 1.6 mil.
 2. Dunn-Edwards Corporation; SZRO10 Spartazero Low Odor / Zero VOC Interior Flat Paint: Applied at a dry film thickness of not less than 1.5 mils.
 3. Benjamin Moore and Company: Ultra Spec 500 Interior Flat Finish N536. Applied at a dry film thickness of not less than 1.8 mil.
 4. Glidden Professional; GP9100 Lifemaster No VOC Interior Flat Latex Wall & Trim Finish: Applied at a dry film thickness of not less than 1.1 mils.
 5. PPG Industries; Speedhide zero Interior Latex Flat 6-4110XI. Applied at a dry film thickness of not less than 1.3 mils
 6. Vista Paint Corporation: 5100 V-Pro Flat Applied at a dry film thickness of not less than 1.8 mil.
- B. High-Performance Architectural Latex System - Low-Luster Acrylic Enamel: Factory-formulated eggshell acrylic-latex interior enamel.
1. Sherwin-Williams; S-W ProMar 200 Zero VOC Eggshell, B20W02651. Applied at a dry film thickness of not less than 1.6 mil.
 1. Dunn-Edwards Corporation; SZRO20 Spartazero Low Odor / Zero VOC Interior Velvet Paint: Applied at a dry film thickness of not less than 1.5 mils.
 2. Dunn-Edwards Corporation; SZRO30 Spartazero Low Odor / Zero VOC Interior Eggshell Paint: Applied at a dry film thickness of not less than 1.5 mils.
 3. Benjamin Moore and Company: Ultra Spec 500 Interior Eggshell Finish N538. Applied at a dry film thickness of not less than 1.8 mil.
 4. Glidden Professional; 1411 Ultra Hide No VOC Acrylic Eggshell Interior Wall & Trim Enamel: Applied at a dry film thickness of not less than 1.4 mils.
 5. PPG Industries; Speedhide zero Interior Latex Eggshell 6-4310XI. Applied at a dry film thickness of not less than 1.5 mils

6. Vista Paint Corporation: 5300 V-Pro Eggshell Applied at a dry film thickness of not less than 1.8 mil.
- B. High-Performance Architectural Latex System - Semigloss Acrylic Enamel: Factory-formulated semigloss acrylic-latex enamel for interior application.
1. Sherwin-Williams; ProMar 200 Zero VOC Sem-Gloss, B31W02651. Applied at a dryfilm thickness of not less than 1.7 mil.
 1. Dunn-Edwards Corporation; SZRO50 Spartazero Low Odor / Zero VOC Interior Semi-Gloss Paint: Applied at a dry film thickness of not less than 1.5 mils.
 2. Benjamin Moore and Company; Ultra Spec 500 Interior Semi-Gloss Finish N539. Applied at a dry film thickness of not less than 1.8 mil.
 3. Glidden Professional; GP9200 Lifemaster No VOC Acrylic Semi-Gloss Interior Wall & Trim Enamel: Applied at a dry film thickness of not less than 1.2 mils.
 4. PPG Industries; Speedhide zero Interior Latex Semi-Gloss 6-4510XI. Applied at a dryfilm thickness of not less than 1.3 mils
 5. Vista Paint Corporation: 5400 V-Pro Semi Gloss Applied at a dry film thickness of not less than 1.8 mil.
- B. High-Performance Architectural Latex System - Full-Gloss Acrylic Enamel: Factory-formulated full-gloss acrylic-latex interior enamel.
1. Sherwin-Williams; Solo 100% Acrylic Interior/Exterior Gloss: Applied at a dry film thickness of not less than 1.5 mils.
 2. Dunn-Edwards Corporation; (ULSH60) Ultrashield Low Odor / Zero VOC Interior /Exterior Gloss Paint: Applied at a dry film thickness of not less than 2.0 mils.
 3. Benjamin Moore and Company; Ultra Spec 500 Interior Gloss Finish N540. Applied at a dry film thickness of not less than 1.8 mil.
 4. Glidden Professional; GP9400 Lifemaster No VOC Interior Acrylic Gloss Finish: Applied at a dry film thickness of not less than 1.2 mils.
 5. PPG; 6-8534 SpeedHide Interior Latex 100 Percent Acrylic Gloss Enamels: Applied at a dry film thickness of not less than 1.2 mil.
 6. Vista Paint Corporation: 7600 Coverall Gloss Applied at a dry film thickness of not less than 1.3 mil.

2.2 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
1. Owner will engage the services of a qualified testing agency to sample paintmaterials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 2. Testing agency will perform tests for compliance with product requirements.
 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application. Comply with procedures specified in PDCAP4.
1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.

- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.
- C. 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. Gypsum Board: 12 percent.
 - 5. Plaster: 12 percent.
- D. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- E. Plaster Substrates: Verify that plaster is fully cured.
- F. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- G. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 - 1. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 1. Use applicators and techniques suited for paint and substrate indicated.
 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. 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.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 1. Paint the following work where exposed in equipment rooms:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Tanks that do not have factory-applied final finishes.
 - h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 2. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - h. Other items as directed by Architect.
 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. 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.
- D. Provide "Wet Paint" signs and other methods to protect newly coated surfaces. Remove when directed or when no longer needed.
- E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

- A. Colors: As indicated on Drawings.
- B. Concrete Substrates, Nontraffic Surfaces:
 - 1. Latex System:
 - a. Prime Coat: Primer sealer, latex, interior.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, flat, (Gloss Level 1).
- C. CMU Substrates:
 - 1. High-Performance Architectural Latex System:
 - a. Block Filler: Block filler, latex, interior/exterior.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2).
 - d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3).
 - e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4).
- D. Steel Substrates:
 - 1. High-Performance Architectural Latex System:
 - a. Prime Coat: Shop primer specified in Section where substrate is specified.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3).
- E. Galvanized-Metal Substrates:
 - 1. High-Performance Architectural Latex System:
 - a. Prime Coat: Primer, galvanized, water based.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3).
- F. Gypsum Board Substrates:
 - 1. High-Performance Architectural Latex System:
 - a. Prime Coat: Primer sealer, latex, interior.

- b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
- c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3).

END OF SECTION

SECTION 09 93 00
STAINING AND TRANSPARENT FINISHING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and application of wood finishes.

1.2 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- D. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- E. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of product indicated.
- C. Samples for Verification: For each type of finish system and in each color and gloss of finish indicated.
1. Submit Samples on representative samples of actual wood substrates 8 inches (200 mm) square or 8 inches (200 mm) long.
 2. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
1. Cross-reference to finish system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 2. VOC content.
- E. Furnish extra materials[, from the same product run,] that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Stains and Transparent Finishes: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.4 SUSTAINABILITY SUBMITTALS

- A. LEED Submittals: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
1. Product Certificates for Credit MR 5.1 and MR 5.2: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
 - a. Include statement indicating distance from manufacturer to Project for each regionally manufactured material.

- b. Include statement indicating location of and distance from Project to point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials.
 - 2. LEED Credit EQ 4.2: Product data for paints and coatings used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.
 - B. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 2. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.
- 1.5 QUALITY ASSURANCE
- A. Mockups: Apply mockups 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 mockups.
 - a. If preliminary stain color selections are not approved, apply additional mockups of additional stain colors selected by Architect at no added cost to Owner.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.
- 1.7 FIELD CONDITIONS
- A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
 - B. Do not apply finishes when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
 - C. Do not apply exterior finishes in snow, rain, fog, or mist.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Sherwin-Williams Company (The).
 - 2. Dunn-Edwards Corporation.
 - 3. Benjamin Moore.
 - 4. Glidden Professional.
 - 5. Vista Paint Corporation.

2.2 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: Products shall comply with VOC limits of authorities having jurisdiction and, for interior stains and finishes applied at project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - C. Paint Maximum Product Emissions Limits: Top coat and primer interior paints must meet current requirements for VOC (Volatile Organic Compounds) limits of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.
 1. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
 2. Shellacs,
 - a. Clear: VOC not more than 730 g/L.
 - b. Opaque: VOC not more than 550 g/L.
 3. Stains: VOC not more than 250 g/L.
 4. Primers, Sealers, and Undercoaters: 200 g/L.
 - D. Low-Emitting Materials: Interior stains and finishes shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - E. Stain Colors: As indicated on Drawings.
- 2.3 WOOD FILLERS
- A. Wood Filler Paste:
 1. Sherwin-Williams; Sher-Wood Fast-Dry Filler.
 2. Dunn-Edwards Corporation; Old Masters Woodgrain Filler.
 3. Benjamin Moore; Benwood Paste Wood Filler No. 238.
 4. Glidden Professional; Jasco Wood Filler PWF2703.
 5. Vista; Jasco Paste Wood Filler PWF 2703.
- 2.4 STAINS
- A. Stain, Semi-Transparent, for Interior Wood: Factory-formulated alkyd-based penetrating wood stain for interior application applied at spreading rate recommended by manufacturer.
 1. Sherwin-Williams; Wood Classics 250 g/l Stain, A49W800 series.
 2. Dunn-Edwards Corporation; Old Masters Water-Based Wood Stain
 3. Benjamin Moore; Benwood Penetrating Stain No. 234.
 4. Glidden Professional; 1700-XXX WoodPride Interior Solventborne Wood Finishing Stain.
 5. Vista; Old Masters Water-Based Wood Stain
- 2.5 WATER-BASED VARNISHES
- A. Varnish, Water Based, Clear, Satin (Gloss Level 4): Factory-formulated clear satin acrylic-based polyurethane varnish applied at spreading rate recommended by manufacturer.
 1. Sherwin-Williams; Wood Classics WB Polyurethane A68.
 1. Dunn-Edwards Corporation; Deft Water Based Satin Polyurethane.
 2. Benjamin Moore; Stays Clear Acrylic Polyurethane No. 423, Satin.
 3. Glidden Professional; 1802-0000 WoodPride Interior Waterborne Aquacrylic Satin Varnish.
 4. Vista; Deft Water Based Satin Polyurethane.
 - B. Varnish, Water Based, Clear, Gloss (Gloss Level 6): Factory-formulated clear gloss acrylic-based polyurethane varnish applied at spreading rate recommended by manufacturer.
 1. Sherwin-Williams; Wood Classics Waterborne Polyurethane Gloss, A68 Series.
 2. Benjamin Moore; Benwood Interior Wood Finishes Polyurethane Finishes High Gloss No. 428.
 3. Glidden Professional; 1808-0000 WoodPride Interior Waterborne Aquacrylic Gloss Varnish.

2.2 SOURCE QUALITY CONTROL

- A. Testing of Materials: Owner reserves the right to invoke the following procedure:
1. Owner will engage the services of a qualified testing agency to sample wood finishing materials. Contractor will be notified in advance and may be present when samples are taken. If materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 2. Testing agency will perform tests for compliance with product requirements.
 3. Owner may direct Contractor to stop applying wood finishes if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying materials from Project site, pay for testing, and refinish surfaces finished with rejected materials. Contractor will be required to remove rejected materials from previously finished surfaces before refinishing with complying materials if the two finishes are incompatible or produce results that, in the opinion of the Architect, are aesthetically unacceptable.

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 the Work.
- B. Maximum Moisture Content of Exterior Wood Substrates: 15 percent, when measured with an electronic moisture meter.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with finish application only after unsatisfactory conditions have been corrected.
1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each particular substrate condition and as specified.
1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
 2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.
- C. Interior Wood Substrates:
1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 2. Apply wood filler paste to open-grain woods to produce smooth, glass like finish.
 3. Sand surfaces that will be exposed to view and dust off.
 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

- A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
1. Use applicators and techniques suited for finish and substrate indicated.
 2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.

3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

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.

3.5 INTERIOR WOOD-FINISH-SYSTEM SCHEDULE

A. Wood substrates, nontraffic surfaces, including wood trim, architectural woodwork, and doors.

B. Semitransparent Stain System:

1. Prime Coat: Stain, semi-transparent, matching topcoat.
2. Topcoat: Stain, semi-transparent, for interior wood.

C. Polyurethane Varnish over Stain System:

1. Stain Coat: Stain, semi-transparent, for interior wood.
2. First Intermediate Coat: Polyurethane varnish matching topcoat.
3. Second Intermediate Coat: Polyurethane varnish matching topcoat.
4. Topcoat: Varnish, interior, polyurethane, oil-modified, satin (Gloss Level 4).

END OF SECTION

SECTION 09 96 23

ANTI-GRAFFITI COATINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Anti-graffiti coating applied to exterior brick wall surfaces.

1.2 SYSTEM DESCRIPTION

- A. Performance Requirements: The application shall leave the finished surfaces uniform in graffiti repellent and not alter the natural color and texture of the masonry units.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's product data sheets on all products to be used for the work. Submit description for protection of surrounding areas and non-masonry surfaces, surface preparation, application, and final cleaning.
- B. Submit samples and manufacturer's instructions to the Architect and Resident Engineer for approval prior to delivering materials to the site or commencing the work in this Section.
1. Manufacturer shall procure and apply system to samples of the masonry units to be used in the structure which will be reviewed by the Architect and Resident Engineer for both aesthetics and effectiveness.
 2. Manufacturers Instructions: Submit current method of installation stating the actual application rates required to meet the guarantee requirements.
- C. Applicator Qualifications: Submit qualifications of applicator.
1. Certification stating applicator is experienced in the application of the specified products.
 2. List of recently completed graffiti resistant coatings projects, including project name and location, names of Owner and Architect, and description of products used, substrates, applicable local environmental regulations, and application procedures.
- D. Regulations: Submit applicable local environmental regulations.
- E. Submit certification that graffiti resistant coatings furnished comply with regulations controlling use of volatile organic compounds (VOC).

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications:
1. Experienced in the application of the specified products.
 2. Employs persons trained for the application of the specified products.
- B. Pre-Application Meeting: Convene a pre-application meeting 7 days before the start of application of graffiti resistant coatings. Require attendance of parties directly affecting work of this section, including the Contractor, Architect and Resident Engineer, applicator, and manufacturer representative. Review environmental regulations, test panel procedures, protection of surrounding areas and non-masonry surfaces, surface preparation, application, field quality control, final cleaning, and coordination with other work.

- C. Regulatory Requirements: Comply with applicable federal, state, and local environmental regulations.
- D. Field Samples:
 - 1. Before full-scale application, review manufacturer's product data sheets to determine the suitability of each product for the specific surfaces. Apply each graffiti resistant coating to test panels to determine number of applications, coverage rates, compatibility, effectiveness, surface preparation, application procedures, and desired results.
 - 2. Apply graffiti resistant coatings to test panels in accordance with manufacturer's written instructions. Allow 48 hours or until test panels are thoroughly dry before evaluating final appearance and results. Do not begin full-scale application until test panels are inspected and approved by the Architect and Resident Engineer.
 - 3. Test Panel Requirements:
 - a. Size: Minimum 4 feet by 4 feet each, or as determined by the Architect and Resident Engineer.
 - b. Locations: As determined by the Architect and Resident Engineer.
 - c. Number: As required to completely test each graffiti resistant coating with each type of substrate to be protected.
 - 4. Apply graffiti to test panel and remove graffiti from surfaces treated with coating in accordance with anti-graffiti coating manufacturer's recommended methods. If required, remove shadows/residues using compatible graffiti remover applied in accordance with manufacturer's written instructions.
 - 5. If required by anti-graffiti coating manufacturer, reapply coating to restore graffiti protection.
 - 6. Retain and protect test panels approved by the Architect and Resident Engineer in undisturbed condition during the work of this section, to be used as a standard for judging the graffiti resistant coating work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage and Handling: Store containers upright in a cool, dry, well ventilated place, out of the sun. Store away from all other chemicals and potential sources of contamination. Keep lights, fire, sparks, and heat away from containers. Do not drop containers or slide across sharp objects. Keep containers tightly closed when not in use. Store and handle materials in accordance with manufacturer's written instructions.

1.6 PROJECT CONDITIONS

- A. Temperature Limitations:
 - 1. Do not apply at surface and air temperatures below 40°F or above 90°F, unless otherwise indicated by manufacturer's written instructions.
 - 2. Do not apply when surface and air temperatures are not expected to remain above 40°F for a minimum of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.
- B. Do not apply under windy conditions such that graffiti resistant coating may be blown to surfaces not intended to be treated.
- C. Do not apply to frozen substrate. Allow adequate time for substrate to thaw, if freezing conditions exist before application.

- D. Do not apply earlier than 24 hours after rain or if rain is predicted for a period of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Anti-graffiti coating as manufactured by the following manufacturers are acceptable:
 - 1. Rust-Oleum Corporation (OKON Graffiti Barrier Coat) www.okoninc.com
 - 2. Diedrich Technologies, Inc. www.diedrichtechnologies.com
 - 3. ProSoCo., Inc.. www.prosoco.com
 - 4. Tamms Industries, Inc. www.tamms.com
 - 5. Rainguard Products Company www.rainguard.com
 - 6. Or equal.

2.2 GRAFFITI CONTROL COATINGS

- A. General
 - 1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 - 2. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
 - 3. Paints and coatings shall comply with CALGreen section 504.4.3.
- B. Clear, one component silicone elastomer for protecting most masonry surfaces subject to repeated graffiti attacks.
 - 1. Form: Liquid.
 - 2. Color: Clear.
 - 3. Active Substance: Silicone elastomer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other work which affects, connects with, or will be concealed by this Work.

3.2 PROTECTION

- A. Protect surrounding areas, landscaping, building occupants, pedestrians, vehicles, and non-masonry surfaces not designated for protection during the work from contact with graffiti resistant coatings, masonry or concrete cleaners if used, residues, rinse water, fumes, wastes, and effluent in accordance with manufacturer's written instructions.
- B. Apply graffiti resistant coatings before installation of windows.
- C. Divert and protect pedestrian and auto traffic.

3.3 SURFACE PREPARATION

- A. Clean dirt, dust, oil, grease, and other contaminants from surfaces that interfere with penetration or performance of graffiti resistant coatings. Use appropriate masonry or concrete cleaners approved by the graffiti resistant coating manufacturer where necessary. Rinse thoroughly using pressure water spray to remove cleaner residues. Allow surfaces to dry completely before application of graffiti resistant coatings.
- B. Repair, patch, and fill cracks, voids, defects, and damaged areas in surface as approved by the Architect and Resident Engineer. Allow repair materials to cure completely before application of graffiti resistant coatings.
- C. Apply specified sealants and caulking and allow to cure completely before application of graffiti resistant coatings.
- D. Seal open joints.
- E. Allow new masonry and concrete construction and repointed surfaces to cure completely before application of graffiti resistant coatings.

3.4 APPLICATION OF GRAFFITI CONTROL COATINGS

- A. Apply graffiti resistant coatings to substrates in accordance with manufacturer's written instructions, environmental regulations, and application procedures determined from test panel results approved by the Architect and Resident Engineer.
- B. Apply to clean, dry, cured, and properly prepared surfaces approved by the Architect and Resident Engineer.
- C. Consult manufacturer's written instructions for information on application equipment to be used and precautions to be taken with the specified products.
- D. Do not dilute or alter graffiti resistant coatings. Apply as packaged.
- E. Do not apply to horizontal or below-grade surfaces.
- F. Do not apply to asphalt or other non-masonry materials.
- G. Do not apply to painted surfaces.
- H. Do not apply to compensate for structural or material defects in substrates.
- I. Avoid overspray, wind drift, and splash of graffiti resistant coatings.

3.5 FIELD QUALITY CONTROL

- A. Examination: Examine the graffiti resistant coating work with the Contractor, Architect and Resident Engineer, applicator, and manufacturer's representative, and compare with test panel results approved by the Architect and Resident Engineer. Determine if the substrates are suitably protected by the graffiti resistant coatings.
- B. Manufacturer's Field Services: Provide the services of a manufacturer's authorized field representative to verify specified products are used, and protection, surface preparation, and application of graffiti resistant coatings are in accordance with the manufacturer's written instructions and the test panel results approved by the Architect and Resident Engineer.

3.6 FINAL CLEANING

- A. Clean site of unused graffiti resistant coatings, residues, rinse water, wastes, and effluent in accordance with environmental regulations.
- B. Remove and dispose of materials used to protect surrounding areas and non-masonry surfaces, following completion of the work of this section.
- C. Repair, restore, or replace to the satisfaction of the Architect and Resident Engineer, materials, landscaping, and non-masonry surfaces damaged by exposure to graffiti resistant coatings.
- D. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

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SECTION 09 96 53
ELASTOMERIC COATINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and application of elastomeric coatings to the following exterior substrates:
 - 1. Portland cement plaster.

1.2 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Indicate VOC content.
- B. Samples for Initial Selection: For each type of elastomeric coating.
- C. Samples for Verification: For each type of elastomeric coating indicated and in each color and gloss.
 - 1. Submit Samples on same type of substrate as that to receive application, 8 inches square.
 - 2. Apply coats on Samples in steps to show each separate coat, including primers and block fillers as applicable.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.
- E. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Quantity: Furnish an additional 5 percent but not less than 1 gal. of each material, color, and texture applied.

1.3 SUSTAINABILITY SUBMITTALS

- A. LEED Submittals: Provide special submittals conforming to Section 018113 – Sustainable Design Requirements for the following:
 - 1. Product Certificates for Credit MR 5.1 and MR 5.2: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
 - a. Include statement indicating distance from manufacturer to Project for each regionally manufactured material.
 - b. Include statement indicating location of and distance from Project to point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials.
 - 2. LEED Credit EQ 4.2: Product data for paints and coatings used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.
- B. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements – CAL-Green, for the following measures:
 - 1. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 2. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.

1.4 QUALITY ASSURANCE

- A. Mockups: Apply mockups 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.
 - 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 mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 90 deg F unless otherwise permitted by manufacturer's written instructions.
- B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
- C. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before starting or continuing coating operation.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace elastomeric coatings that fail within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Water penetration through the coating.
 - b. Deterioration of coating beyond normal weathering.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers:
 - 1. Sherwin-Williams Company (The).
 - 2. Dunn Edwards.
 - 3. Glidden Professional.
 - 4. Prior approved equal.

2.2 MATERIALS

- A. Paint Maximum Product Emissions Limits: Top coat and primer interior paints must meet current requirements for VOC (Volatile Organic Compounds) limits of South Coast Air Quality

Management District (SCAQMD) Rule No. 1113 and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.

1. Cal-GREEN Requirements for typical paint coatings:
 - a. Primers, Sealers, and Undercoaters: 100 grams per liter of product minus water.
 - b. Flats: 50 grams per liter of product minus water.
 - c. Non-flats: 100 grams per liter of product minus water.
 - d. Non-flat High Gloss: 150 grams per liter of product minus water.
- B. Moisture-Vapor Transmission: Minimum 30-40 perms, based on testing according to ASTM D 1653.
- C. Material Compatibility:
 1. Materials for use within each paint system shall be 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, products shall be recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- D. Colors: As selected by Architect from manufacturer's full range.
- E. Crack Fillers: Elastomeric coating manufacturer's recommended, factory-formulated crack fillers or sealants, including crack filler primers, compatible with substrate and other materials indicated.
- F. Primer: Factory-formulated alkali-resistant acrylic-latex primer for exterior application.
 1. Dunn-Edwards Corporation; Elast-O-Kote: Applied at a dry film thickness of not less than 1.5 mils.
 2. Glidden Professional; Hydrosealer Primer/Sealer 6001: Applied at a dry film thickness of not less than 1.6 mils.
 3. Sherwin-Williams; Loxon Concrete & Masonry Primer A24W08300: Applied at a dry film thickness of not less than 3.0 mils.
- G. Elastomeric Coatings: Factory-formulated smooth elastomeric coating.
 1. Dunn-Edwards Corporation; Elast-O-Kote DE 7100: Applied at a dry film thickness of not less than 12 mils.
 2. Glidden Professional; 2210 Decra-Flex 300 Exterior Elastomeric Coating 2260: Applied at a dry film thickness of not less than 12 mils.
 3. Sherwin-Williams; Sherlastic Elastomeric Coating. Applied at a dry film thickness of not less than 6.4 mils dry per coat.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with manufacturer's requirements for maximum moisture content, alkalinity, and other conditions affecting performance of work.
- B. Begin coating only when moisture content of substrate is 12 percent or less when measured with an electronic moisture meter.
- C. Begin coating no sooner than 28 days after substrate is constructed and is visually dry on both sides.
- D. Verify that substrate is within the range of alkalinity recommended by manufacturer.
- E. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- F. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions applicable to substrates and coating systems indicated.
- B. Remove hardware and hardware accessories, plates, machined surfaces, light fixtures, and similar items already installed that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
 - 1. After completing coating operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, and incompatible paints and encapsulants. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce coating systems indicated.
 - 2. Perform cleaning and coating application so dust and other contaminants from cleaning process will not fall on wet, newly coated surfaces.
- D. Crack Repair: Fill cracks according to manufacturer's written instructions before coating surfaces.

3.3 APPLICATION

- A. Apply elastomeric coatings according to manufacturer's written instructions.
 - 1. Use equipment and techniques best suited for substrate and type of material being applied.
 - 2. Coat surfaces behind movable items the same as similar exposed surfaces.
 - 3. Apply each coat separately according to manufacturer's written instructions.
- B. Primers: Apply at a rate to ensure complete coverage.
- C. Elastomeric Finish Coats: Minimum two coats with a total dry film thickness of 16 to 18 mils.
- D. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats similar to color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- E. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform finish, color, and appearance.
- F. Apply coatings 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.
- G. Apply coatings to prepared surfaces as soon as practicable after preparation and before subsequent surface soiling or deterioration.
- H. Spray Application: Use spray equipment for application only when permitted by authorities having jurisdiction. Wherever spray application is used, do not double back with spray equipment to build up film thickness of two coats in one pass.

3.4 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following testing procedures:
 - 1. Owner will engage the services of a qualified testing agency to sample materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - 2. Testing agency will perform tests for compliance of materials with product requirements.
 - 3. Owner may direct Contractor to stop coating application if test results show materials being used do not comply with requirements. Remove noncomplying materials from Project site, pay for testing, and recoat surfaces that were coated with rejected materials. Remove

rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

- B. Field Testing and Inspection: Owner reserves the right to engage the services of a qualified testing agency to verify installed thickness of elastomeric coatings.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities, touch up and restore damaged or defaced coated surfaces.

3.6 ELASTOMERIC COATING SCHEDULE

- A. Stucco Substrates:
 - 1. Elastomeric Coating System:
 - a. Prime Coat: As recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - c. Topcoat: Elastomeric, pigmented, exterior, water-based, flat coating.

END OF SECTION

SECTION 10 11 00

VISUAL DISPLAY BOARDS

PART 1 GENERAL

1.1 SUBMITTALS

- A. Shop Drawings: Submit brochures showing mounting techniques.
- B. Samples: Submit color samples of visual display board surfaces.
- C. Contract Closeout Submittals: Submit 2 copies of Manufacturer's printed maintenance instructions in accordance with Section 01 77 00.
- D. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.2 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact. Protect finished surfaces with removable wrapping or coating which will not bond when exposed to sunlight.
- B. Storage: Adequately protect against damage while stored at the site.

1.3 WARRANTY

- A. Furnish Manufacturer's printed standard warranty.

PART 2 MATERIALS

2.1 MANUFACTURERS

- A. Furnish products of one of the following Manufacturers, except as approved by the Architect and Resident Engineer, subject to compliance with Specification requirements.
 - 1. Lemco Corporation
 - 2. Tri-Adco Manufacturing Company
 - 3. Claridge Products and Equipment Inc.
 - 4. Best-Rite Chalkboard Company
 - 5. Greensteel Inc.
 - 6. Alliance Wall Corporation
 - 7. Nelson-Adams Co. (Naco)
 - 8. Or equal.

2.2 LIQUID MARKER BOARDS

- A. Core: 3/8 inch particle board.
- B. Backing: Aluminum foil.

- C. Finish: 24 gage stretcher-level steel sheet manufactured in accordance with the performance specification for porcelain enamel steel chalkboards. Enamel finish shall be applied automatically to the steel, in a uniform thickness and fired under rigidly controlled temperatures to fuse the porcelain permanently to the steel. Finished surface shall be highly scratch and stain resistant, made for dry erase markers.
- D. Aluminum Trim: Snap-on type.
 - 1. Chalk trough: Claridge No. 271 or equal.
 - 2. Map rail: Claridge No. 275 with No. 277 ground clip or equal, with 4 map clips per each 8'-0" section.
 - 3. Side trim: Claridge No. 273 or equal.
 - 4. Finish: Clear anodized.

2.3 FABRICATION

- A. Factory assemble visual display board and ship to the job, ready to fasten to wall, pressure laminated to backing and framed on each side with extrusions as shown on review shop drawings and as specified.
- B. Combination Units: Fabricate boards to be installed as combination units with vertical mullion type joint trim between adjacent boards for installation as one joined combination unit.
- C. Aluminum extrusions: Cut to exact length and accurately. At corners, except at chalk trough, reinforcing angles shall be used.
- D. Sizes: As indicated on Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work shall be construed as acceptance of subsurfaces.
- B. Verify that substrate has been prepared for proper installation of resilient materials.

3.2 INSTALLATION

- A. Visual Display Boards:
 - 1. Install at locations shown on Drawings in accordance with Manufacturer's printed Specifications, except as otherwise detailed.
 - 2. Install plumb, level and true to line, securely attached to grounds, blocking and supports.

3.3 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

SECTION 10 14 00

SIGNAGE

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Exterior cast or fabricated metal building signage.
 - 2. Interior identification signage.
 - 3. Other signage as required.

1.2 SUBMITTALS

- A. Product Data: Submit Manufacturer's brochures indicating materials and finishes.
- B. Shop Drawings: Show sizes of members, method of construction, copy layout, and mounting details for proper mounting. Furnish template for mounting metal letters.
- C. Samples: Furnish full size rubbing prior to casting plaque. Submit sample letter and anchoring device. Submit selection of aluminum plaque finishes for Architect's and Resident Engineer's approval.
- D. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with the following:
 - 1. ANSI A117.1, 1998 "Accessible and Usable Buildings and Facilities."
 - 2. Public Law 101-336 "The Americans with Disabilities Act of 1990 (ADA)."
 - 3. ADA Accessibility Guidelines (ADAAG).

1.4 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Storage and Protection: Store items in dry, protected areas. Adequately protect against damage while stored at the site. Keep free of corrosion or other damage.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions shown on Drawings by taking field measurements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Furnish products of Chalaine Signage (858) 566-8868 or equal with 2 years' experience in manufacturing and installing signage, subject to compliance with Specification requirements:

2.2 MATERIALS

- A. General: Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
- B. Materials shall be new stock, free from defects, imperfections strength, durability, and appearance. Provide materials as shown and detailed on drawings and as specified herein.
- C. Metals - General:
 - 1. For fabrication of exposed metal work, use only materials which are smooth and free of surface blemishes including pitting, roughness, seam marks, roller marks, and trade names.
 - 2. Do not use materials which have stains and discolorations.
 - 3. For exposed items of work which include plain flat surfaces in width of more than 50 times the metal thickness, provide sheet stock from mill which has been stretcher leveled to highest standard of flatness commercially available.
- D. Cast Acrylic Sheet: Provide cast (not extruded or continuous cast) methyl methacrylate monomer plastic sheet, in sizes and thicknesses indicated, with a minimum flexural strength of 16,000 psi when tested in accordance with ASTM D 790, a minimum allowable continuous service temperature of 176 deg F (80 deg C), and of the following general types:
 - 1. Colored Coatings for Acrylic Plastic Sheet: Use colored coatings, for background colors, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are nonfading for the application intended.
 - 2. Transparent Sheet: Where sheet material is indicated as "clear," provide colorless sheet in matte finish, with light transmittance of 92 percent, when tested in accordance with the requirements of ASTM D 1003.
 - 3. Opaque Sheet: Where sheet material is indicated as "opaque," provide colored opaque acrylic sheet in colors and finishes as selected from the manufacturer's standards.
- E. Aluminum Sheet: Provide aluminum sheet of alloy and temper recommended by the aluminum producer or finisher for the type of use and finish indicated, and with not less than the strength and durability properties specified in ASTM B 209 for 5005-H15.
- F. Vinyl Film: Opaque reflectorized vinyl film, 0.0035-inch minimum thickness, with pressure-sensitive adhesive backing, suitable for exterior as well as interior applications.
- G. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.
- H. Tape: VHB (very high bond) double-stick foam tape as manufactured by 3M or equal.

- I. Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.3 SIGNAGE

- A. Exterior signage and signage framing: Aluminum unless otherwise indicated on Architectural Building Elevation Drawings.
- B. Interior Signage: All interior signage (wall and door) shall comply with applicable ADA requirements.
 1. Base: Melamine plastic laminate, 1/8 inch thick, rated non-static, fire retardant and self extinguishing.
 - a. Colors: As selected by Architect and Resident Engineer and in accordance with local and Federal requirements
 - b. Mounting: Screw attach to wall or door or door frame as indicated by Construction Manager. Minimum 2 screws per sign. Height shall be 60 inches above finish floor to centerline of sign at wall mounted signs..
 - c. Finish and contrast:
 - (1) Matte finish.
 - (2) Characters shall contrast with background by at least 20 percent.
 2. Letters and Braille characters:
 - a. Raised 1/32 inch upper case, sans serif or simple serif, and accompanied with Grade 2 Braille. Raised characters shall be at least 5/8 inch high, but not higher than 2 inches.
 - b. Letters and numbers: Width-to-height ratio from 3:5 to 1:1, and stroke width-to-height ratio from 1:5 to 1:10.
 - c. Text: Required quantity of each sign shall be as directed by Architect and Resident Engineer.
- C. Provide the following signage and other signage as indicated on Drawings:
 1. Wall sign: "EXIT" tactile wall sign (TWS) per CBC 1011.32 (see locations per drawings – near doors #100, #105B, 116B – total of three).
 2. Wall sign: "STAIR UP" "STAIR DOWN" (see locations per drawings – reflected ceiling plan - total of 6).
 3. Wall sign: "NOTICE: RECYCLED RAINWATER IS BEING UTILITZED IN TOILET FIXTURE" (filed verify exact sign location with Architect and Resident Engineer – typical of 8 locations).

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Construction Manager. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other Work which affects, connects with, or will be concealed by this Work.

3.2 INSTALLATION

- A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
- B. At exterior locations, apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.
- C. Install plumb and level in accordance with Manufacturer's instructions.
- D. Install engraved signs after surfaces are finished, in locations indicated.
- E. Securely fasten wall mounted items to solid backing.
- F. Clean and polish exposed surfaces.
- G. Wall Mounted Panel Signs: Attach panel signs to wall surfaces using the methods indicated below:
- H. Silicone-Adhesive Mounting: Use liquid silicone adhesive recommended by the sign manufacturer to attach sign units. Use double-sided vinyl tape where recommended by the sign manufacturer to hold the sign in place until the adhesive has fully cured.
- I. Double-Stick Tape Mounting: Clean surfaces to be joined and apply double stick tape to back of wall mounted signage in continuous strips at approximate 2 inch center to center spacing between strips. Apply sign to wall surface taking care to properly align and plumb signage before removing release paper.

3.3 CLEANING

- A. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of away from premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

SECTION 10 14 53

TRAFFIC CONTROL SIGNS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Traffic Control Signage as shown on the Drawings and as specified.
- B. Provide signage designating parking for any combination of low-emitting, fuel-efficient and carpool / van parking in accordance with CALGreen section 5.106.5.1

1.2 SUBMITTALS

- A. Submit product data, shop drawings and samples in accordance with Section 01 33 00.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Metals: New stock, free from defects impairing strength, durability or appearance.
- B. Plastics: New stock, free from defects and of the best quality available.
- C. Paints: Type made for the surface material on which it is to be applied and recommended by the manufacturer of the paint. No paint that will fade, discolor or delaminate as a result of proximity to UV light sources or heat there from shall be used.
- D. Signage Supports: Steel pipes with welded steel caps. Paint with acrylic polyurethane enamel.

2.2 FABRICATION

- A. Fabricate in accordance with applicable local jurisdiction Standard Details and as indicated on Drawings.
- B. Shop/Factory/Finishing:
 - 1. Paint shall be thoroughly and evenly applied and shall be well worked into corners and joints and shall not have edge or joint buildups.
 - 2. Paint shall be evenly applied and without pinholes, scratches, orange peeling, application marks, etc.
 - 3. Workmanship in connection with finishes shall conform to the standard of the trade. Prime coats or other surface pre-treatments, where recommended by the manufacturer for paints, shall be included in the work.

PART 3 EXECUTION

3.1 ERECTION, INSTALLATION, APPLICATION

- A. Install items square, plumb, true and accurately fitted. Leveling is to be done only by instruments.
- B. Embed signage support pipes in concrete filled holes as detailed.

3.2 CLEANING

- A. After installation, surfaces marred during erection, and exposed bolts, bolt heads, etc., shall be retouched with the same paint used previously.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

**SECTION 10 20 20
METAL WALL LOUVERS**

PART 1 - GENERAL

1.1.1 SUBMITTALS

- A. Submit shop drawings indicating the following:
 - 1. Details of fabrication and erection.
 - 2. Anchorage, accessories, and finishes.
- B. Submit manufacturer's certificate.
- C. Submit samples of Kynar finish.
- D. Provide manufacturer's data on the post-consumer and post-industrial recycled content of the materials of this section.
- E. Provide manufacturer's data highlighting the address of the manufacturer of the materials of this section.
- F. Provide manufacturer's data highlighting the locations of extraction/harvest of the raw materials used in the manufacturing of the material of this section.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials: Aluminum sheet, ASTM B221, alloy 60603-T52.
- B. Specify materials in this section to have at least 5-10% recycled content (post consumer x material cost + .5(pre-consumer material cost) to meet the requirements established by LEED v2.1 Materials and Resources credit(s) 4.1/4.2
- C. At least 20% of the materials in this section to be manufactured within 500 miles of the project site.

2.2 FABRICATION

- A. Provide louvers, bird screens and accessories of design, materials, sizes, depth, arrangement, and metal thickness required.
- B. Horizontal blade louver extrusion thickness:
 - 1. 4 inch depth, not less than 0.081 inches.
- C. Aluminum Finish: All aluminum exposed to view shall be given a fluorocarbon coating of "Kynar 500" as produced by Penwalt Chemical Co., or equal (no known equal). The coating shall conform to the applicable requirements of the "Specification for High Performance Organic Coating on Architectural Extrusions and Panels" AAMA 605-1 and shall contain a minimum of 70 percent "Kynar 500" resin, and a minimum 0.8 mil dry film thickness applied over an approved primer with a minimum 0.2 mil dry film thickness. The coating system shall be applied by a coil

or spray applicator experienced in the handling and application of "Kynar 500" coatings. The coating must be shop applied and oven baked in accordance with the manufacturer's written procedures.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Check to assure that dimensions conform to drawings.
- B. Do not install louvers until defects have been corrected.

3.2 INSTALLATION

- A. Install louvers as shown in shop drawings.
- B. Follow procedures in manufacturer's recommended installation instructions.

3.3 ADJUST AND CLEAN

- A. Clean surfaces of louvers and adjacent structure.
- B. Repair any damage to louvers to match original, or replace.

END OF SECTION

SECTION 10 26 01

MANUFACTURED WALL AND CORNER GUARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Corner guards.

1.2 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

1.3 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate physical dimensions, features, anchorage details, and rough-in measurements.
- C. Samples: Submit three sections of crash rail and corner guard and wall protection, 24 inch (600 mm) long, illustrating component design, configuration, color and finish.
- D. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention.

1.4 SUSTAINABILITY SUBMITTALS

- A. LEED Submittals: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
 - 2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
 - a. Include statement indicating location of manufacturer and point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials. Indicate distance to Project and fraction by weight of each regionally manufactured material that is regionally extracted.
 - 3. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the specified materials. Provide the product manufacturer's most current VOC emissions data.
 - 4. Laboratory Test Reports for Credit IEQ 4.1: For adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - 5. Product Data for Credit IEQ 4.4: For adhesives and composite wood products, documentation indicating that products contain no urea formaldehyde.
- B. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.

1.5 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: Provide impact-resistant, plastic wall protection units with surface-burning characteristics as determined by testing identical products per ASTM E 84, NFPA 255, or UL 723 by UL or another qualified testing agency.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
- C. Provide each type of wall and corner guard accessory by same manufacturer.

1.6 MOCK-UP

- A. Comply with general mock-up requirements specified in Section 014000.
- B. Mock-up: Provide mock-up of one 8 foot long sample or single unit of each specified item, in selected colors.
 - 1. Locate where directed.
 - 2. Mock-up may remain as part of the Work.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store impact-resistant wall protection units in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install impact-resistant wall protection units until building is enclosed and weatherproof, wet work is complete and dry, and HVAC system is operating and maintaining temperature at 70 deg F (21 deg C) for not less than 72 hours before beginning installation and for the remainder of the construction period.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of impact-resistant wall protection units that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Deterioration of plastic and other materials beyond normal use.
 - 2. Verify available warranties and warranty periods for units and components with manufacturers listed in Part 2 articles.
 - 3. Warranty Period: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 COMPONENTS

- A. Metal Corner Guards - Surface Mounted: Fabricated from one-piece, formed or extruded metal with formed edges; with 90- or 135-degree turn to match wall condition..
 - 1. Material: Stainless steel, Type 304.
 - a. Finish: Directional satin, No. 4.
 - 2. Size: 3-1/2 inches (88.9 mm).
 - 3. Height: Full height of wall to ceiling.
 - 4. Mounting: Oval head, countersunk screws through factory-drilled mounting holes.
 - 5. Length: One piece.
 - 6. Basis of Design Manufacturer:
 - a. Construction Specialties, Inc.; Product CO-8: www.c-sgroup.com.

- b. Other Acceptable Manufacturer:
 - 1) Inpro: www.inprocorp.com.
 - 2) Korogard Wall Protection Systems; a division of RJF International Corporation; www.korogard.com
 - 3) Wallguard; www.wallguard.com
 - 4) Prior approved equal.

2.2 ACCESSORIES

- A. Primers and Adhesives:
 - 1. Materials required by wall protection product manufacturer for particular product and substrate moisture content and condition.
 - 2. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 on the interior of the building.
 - a. Current requirement refers to the date on which the materials are installed in the building.
 - b. A copy of SCAQMD Rule #1168 is included in section 018113 that was current as of the date of this specification. Refer to <http://www.aqmd.gov/rules> for the actual current version of the rule that will be applicable at the date of installation during construction.

2.3 FABRICATION

- A. Pre-drill holes for attachment.
- B. Fabricate impact-resistant wall protection units to comply with requirements indicated for design, dimensions, and member sizes, including thicknesses of components.

2.4 METAL FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Remove tool and die marks and stretch lines, or blend into finish.
 - 2. Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 3. Run grain of directional finishes with long dimension of each piece.
 - 4. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- B. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances, fire rating, and other conditions affecting performance of work.
- B. Examine walls to which impact-resistant wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
 - 1. For impact-resistant wall protection units attached with adhesive or foam tape, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.
- D. Verify that field measurements are as indicated on Drawings.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing impact-resistant wall protection system components.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

- A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to wall framing members only.
 - 1. Location: Locate as indicated on Drawings.
- B. Provide splices, mounting hardware, anchors, and other accessories required for a complete installation.

3.4 TOLERANCES

- A. Maximum Variation From Required Height: 1/4 inch (6 mm).
- B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch (6 mm).

3.5 CLEANING

- A. Immediately after completion of installation, clean plastic covers and accessories using a standard, ammonia-based, household cleaning agent.
- B. Retain paragraph below if using adhesive.
- C. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION

SECTION 10 28 00
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Accessories for toilet rooms and utility rooms.
- B. Grab bars.
- C. Owner furnished Owner installed items.
- D. Owner furnished Contractor installed items.
- E. Contractor furnished Contractor installed items.

1.2 RELATED REQUIREMENTS

- A. Section 088300 - Mirrors: Other mirrors.

1.3 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; 2009.
- D. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2014e1.
- E. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- F. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium; 2011e1.
- G. ASTM C1036 - Standard Specification for Flat Glass; 2011e1.
- H. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2008 (Reapproved 2013).
- I. ASTM F446 - Standard Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area; 1985 (Reapproved 2009).

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate locations of accessories with other work to avoid interference, and to assure proper operation and servicing of accessory units.
 - 2. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.5 SUBMITTALS

- A. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- B. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

1.6 QUALITY ASSURANCE

- A. Provide accessories by the same manufacturer for each type of accessory unit, and for units exposed in the same areas, to ensure matching of finishes.
- B. Comply with ASTM F446 for grab bars and accessories, anchorage, test methods, and performance.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver accessories to site until rooms in which they are to be installed are ready to receive them.
- B. Pack accessories individually in a manner to protect accessory and its finish.

PART 2 PRODUCTS

2.1 PRODUCTS

- A. Owner-Furnished, Owner-Installed, and Owner-Furnished, Contractor-Installed Accessories: See schedule at the end of this Section for items provided or furnished by Facilities Services (or Contracted Service provider), located on drawings by Architect and installed by Owner or Contractor.

2.2 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
 - 1. Grind welded joints smooth.
 - 2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.
- B. Keys: Provide two keys for each accessory to Owner.
- C. Stainless Steel Sheet: ASTM A666, Type 304.
- D. Stainless Steel Tubing: ASTM A269/A269M, Type 304 or 316.
- E. Fasteners, Screws, and Bolts: Hot dip galvanized, tamper-proof, security type.
- F. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.3 FINISHES

- A. Stainless Steel: No. 4 Brushed finish, unless otherwise noted.
- B. Chrome/Nickel Plating: ASTM B456, SC 2, satin finish, unless otherwise noted.
- C. Back paint components where contact is made with building finishes to prevent electrolysis.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.
- D. Verify that field measurements are as indicated on Drawings.

- E. See Section 06 1000 for installation of blocking, reinforcing plates, and concealed anchors in walls and ceilings.

3.2 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.
- C. Before starting work notify Architect in writing of any conflicts detrimental to installation or operation of units.
- D. Verify with Architect exact locations of accessories.

3.3 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on the drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated on Drawings.
- D. Use concealed fasteners wherever possible.
- E. Where exposed mounting devices and fasteners are necessary, provide such devices finished to match accessory; use security type fasteners for all exposed accessory mountings.
- F. Unless otherwise indicated, align accessory units with adjacent fixtures and other elements within the same area. Conform to ANSI/ICC A117.1 for positions and mounting heights.

3.4 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.
- B. Protect adjacent or adjoining finished surfaces and work from damage during installation of work of this Section.
- C. Protect exposed accessory finishes from damage until final acceptance of the Work.

3.5 CLEANING AND ADJUSTMENT

- A. Clean and polish all exposed surfaces after installation, and after removal of labels and protective coatings or coverings.
- B. Test and adjust accessories for proper and smooth operation.

3.6 ACCESSORY SCHEDULE

- A. Contractor-Furnished, Contractor-Installed Accessories:
 - 1. Double Roll Toilet Paper Dispenser: Bobrick B-6867 (1 per water closet).
 - 2. Paper Towel Holder: Bobrick B-359.
 - 3. Trash receptor.
 - a. Rubbermaid: model 3546 with lid model 2672
 - 4. Grab Bar - GB:
 - a. Basis-Of-Design-Product: Series B-5806 by Bobrick Washroom Equipment, Inc.
 - b. Mounting: Flanges with concealed fasteners.
 - c. Material: Stainless steel, 0.05 inch thick with a No. 4 non-directional satin finish.
 - d. Outside Diameter: 1-1/2 inch.
 - e. Configuration and Length: As indicated on the Drawings.
 - 5. Glass Mirror With Stainless Steel Angle Frame - M.1:
 - a. Basis-Of-Design-Product: B290-3672 Series by Bobrick Washroom Equipment, Inc.

- b. Frame: Stainless steel angle with corners welded smooth.
 - c. Mirror glass: 1/4 inch thick polished float glass, ASTM C 1036, Type I, Class 1, quality Q1 mirror select; silver-coated, hermetically sealed with uniform electrolytically-deposited copper plating, back-painted with waterproof coating.
 - d. Hangers: Types that produce rigid, tamper- and theft-resistant installation, using wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
 - e. Special size: 36 inches wide by 72 inches high.
6. Shower Seats - SS.1:
- a. Basis-of-Design Product: B-5191 by Bobrick Washroom Equipment, Inc.
 - b. Seat: Phenolic one-piece construction in matte finish ivory color, melamine surfaces and black phenolic resin core, with integral slots for water drainage.
 - c. Frame: Type-304 stainless steel with satin finish. Minimum 16-gauge, 1-1/4-inch square tubing and minimum 18-gage, one-inch diameter seamless tubing.
 - d. Mounting Flanges, Baseplate, Spring and Guide Bracket: Type-304 stainless steel with satin finish.
 - e. Location: ADA shower stalls.
7. Vendor: Bobrick B-3500 (1 per Women's Restroom).
- a. Type: Sanitary napkin and tampon.
 - b. Mounting: Fully recessed, designed for 4-inch wall depth.
 - c. Operation: Single coin (25 cents).
 - d. Exposed Material and Finish: Stainless steel, No. 4 finish (satin)
 - e. Lockset: Tumbler type with separate lock and key for coin box.
 - f. Sanitary-Napkin Disposal Unit: Bobrick B-271 (1 per Woman's water closet.
 - 1) Mounting: Surface mounted.
 - 2) Door or Cover: Self-closing, continuous hinged disposal-opening top cover.
 - 3) Receptacle: Removable, stainless steel receptacle fitted with spring clip for deodorizer block.
 - 4) Material and Finish: Stainless steel, No. 4 finish (satin).
 - 5) Shelf: Stainless steel.
 - g. Towel Shelf w/ Towel Bar: Bobrick B-76767 (1 per shower area).
 - 1) Mounting: Surface mounted.
 - 2) Material and Finish: Stainless steel, No. 4 finish (satin).
 - h. Robe Hook: Bobrick B-76727 (1 per shower area).
 - 1) Mounting: Surface mounted.
 - 2) Material and Finish: Stainless steel, No. 4 finish (satin).
8. Privacy curtain: Bobrick B-204-3 (1 per shower area except customer shower).
9. Mounting: on curtain rod
10. Material and Finish: vinyl.
11. Curtain Rod: Bobrick B-6047 (1 per shower area except customer shower).
- a. Mounting: Surface mounted.
 - b. Material and Finish: Stainless steel, satin finish.
 - c. Length: as required per plan
12. Curtain Hooks: Bobrick B-204-1 (1 set per shower area except customer shower).
- a. Mounting: rod mounted.
 - b. Material and Finish: Stainless steel.
13. Mirror Unit: Bobrick (Except customer toilet room)
- a. Basis-of-Design Product: Bobrick B-290
 - b. Frame: Stainless-steel angle, 0.05 inch thick
 - c. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
14. Childcare Accessories:
- a. Diaper-Changing Station - BCS:
 - 1) Basis-of-Design product: Koala Kare No. B200.

- 2) Description: Horizontal unit that opens by folding down from stored position and with child-protection strap, engineered to support a minimum of 200-lb. static load when opened.
 - 3) Mounting: Surface-mounted, with unit projecting not more than 4 inches from wall when closed.
 - 4) Operation: by pneumatic shock-absorbing mechanism.
 - 5) Material and finish: HDPE in manufacturer's standard color.
 - 6) Size: 35 inches wide by 18 inches high (closed by 4 inches deep).
15. Under Lavatory Guards:
- a. 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) Plumberex Specialty Products, Inc.
 - 2) TCI Products.
 - 3) Truebro, Inc.
 - b. Under lavatory Guard - ULG
 - c. Basis-of-Design Products: Truebro, Inc. Lav Guard
 - d. Description: Insulating pipe covering for supply and drain piping assemblies, that prevent direct contact with and burns from piping, and allow service access without removing coverings.
 - e. Material and Finish: Antimicrobial, molded-plastic, white.
 - f. Provide under all lavatories with exposed plumbing
16. Custodial Accessories:
- a. Mop and Broom Holder - MBH:
 - b. Basis-of-Design Product: B-239 by Bobrick Washroom Equipment, Inc.
 - c. Description: Three spring-loaded, rubber hat, cam type unit with shelf, hooks, and holders suspended beneath shelf.
 - d. Length: 34 inches.
 - e. Hooks: Four.
 - f. Material and Finish: Stainless steel, No. 4 finish (satin).
 - g. Shelf: Not less than nominal 0.05-inch- (1.3-mm-)
 - h. Rod: Approximately 1/4-inch thick stainless steel.

END OF SECTION

SECTION 10 41 16
EMERGENCY ACCESS KEY BOXES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fire department emergency access key boxes.

1.2 SYSTEM DESCRIPTION

- A. Emergency Access Key Boxes: High security key-locked vaults approved by Fire Department, sized and configured to house entrance keys to designated spaces and rooms, and accessed by single master key controlled by Fire Department to provide rapid emergency access to those designated spaces and rooms.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Before starting emergency access key box installation, conduct conference at Project site.
 - 1. Meet with Owner, Architect, and Fire Marshal.
 - 2. Agenda: Review products, installation procedures and coordination with related work. Coordinate location of emergency access key box with Fire Marshal.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of postal specialty.
- B. Shop Drawings: For emergency access key box.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Include identification sequence for compartments.
 - 3. Include layout of identification text.
 - 4. Include setting drawings, templates, and installation instructions for anchor bolts and other anchorages installed as part of the Work of other Sections.

1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

1.6 QUALITY ASSURANCE

- A. Manufacturer: Companies specializing in manufacturing emergency access key boxes with minimum 2 years documented experience.
- B. Installer: Company specializing in installation of emergency access key boxes with minimum 3 documented experience.

1.7 REGULATORY REQUIREMENTS

- A. Comply with requirements of CFC Section 506.

PART 2 PRODUCTS

2.1 EMERGENCY ACCESS KEY BOXES

- A. A. Emergency Access Key Boxes: Heavy duty steel case with hinged door for recessed mounting.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Knox-Box 3200 Series Hinged Door Model.
 - a. Prior approved equal.
2. Mounting: Recessed.
3. Case: 1/4 inch thick welded steel plate; 30 cubic inch capacity capable of holding up to 10 keys and access cards.
4. Size: 5 inches wide by 4 inches high by 3 inches deep.
5. Recessed Mount Flange: Steel face flange secured to case; 7 inches wide x 7 inches high.
6. Door: 1/2 inch thick solid plate steel with interior gasket seal and stainless steel hinge; 1/8 inch thick stainless steel lock cover with hole for tamper proof seal.
7. Lock: Double-action rotating tumblers and hardened steel pins access by biased cut key; keyed to Fire Department master key.
8. Finish: Manufacturer's Knox-Coat proprietary finishing process; "aluminum" color.

2.2 ACCESSORIES

- A. Recessed Mounting Kit: Provide manufacturer's standard shell housing and mounting hardware for casting into concrete or setting into masonry construction.
- B. Fasteners: Grade 5 zinc plated steel carriage screws with nuts; fabricated from quenched and tempered steel with minimum 120,000 psi tensile strength; coarse thread; thread length at least 2 times screw diameter plus 1/4 inch; 3/8 inch diameter by lengths sufficient to secure emergency access key box to backing plates at recessed locations and through wall at surface mounted locations.
- C. Sealant: As specified in Section 079200 - Joint Sealants.

2.3 FABRICATION

- A. Form emergency access key boxes to required shapes and sizes, with true lines and angles, square, rigid, and without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges and corners free of sharp edges and burrs and safe to touch. Fabricate doors of emergency access key boxes to preclude binding, warping, or misalignment.
- B. Preassemble emergency access key boxes in shop to greatest extent possible to minimize field assembly.
- C. Mill joints to a tight, hairline fit. Cope or miter corner joints. Form joints exposed to weather to exclude water penetration.
- D. Drill or punch holes required for fasteners and remove burrs. Use security fasteners where fasteners are exposed. If used, seal external rivets before finishing.
- E. Weld in concealed locations to greatest extent possible without distorting or discoloring exposed surfaces. Remove weld spatter and welding oxides from exposed surfaces.
- F. Where dissimilar metals contact each other, protect against galvanic action by painting contact surfaces with bituminous coating or by applying other permanent separation as recommended by manufacturers of dissimilar metals.

2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer and fire marshal present, for compliance with requirements for roughing-in openings, clearances, and other conditions affecting performance of the Work.
- B. Examine walls and other adjacent construction for suitable conditions before installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install emergency access key box in accordance with Fire Department requirements and with manufacturer's instructions and recommendations.
- B. Install emergency access key boxes level and plumb, according to manufacturer's written instructions.
 - 1. Install recess mounted emergency access key boxes flush in non-rated framed construction. Install surface mounted emergency access key boxes in fire-rated framed construction, concrete construction and masonry construction.
 - 2. Where dissimilar metals contact each other, protect against galvanic action by painting contact surfaces with bituminous coating or by applying other permanent separation as recommended by manufacturer.
 - 3. Where aluminum contacts grout, concrete, masonry, or wood, protect against corrosion by painting contact surfaces with bituminous coating.
- C. Emergency Access Key Boxes: Install emergency access key boxes with centerline not more than 48 inches above finished floor.

3.3 FIELD QUALITY CONTROL

- A. Examine and test emergency access key boxes.

3.4 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as emergency access key boxes are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust doors, hardware, and moving parts to function smoothly, and lubricate as recommended by manufacturer. Verify that integral locking devices operate properly.
- C. Touch up marred finishes or replace emergency access key boxes that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by in-wall payment drop box manufacturer.
- D. Replace emergency access key boxes that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
- E. On completion of emergency access key boxes installation, clean interior and exterior surfaces as recommended by manufacturer.

END OF SECTION

SECTION 10 44 00

FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.1 SUBMITTALS

- A. Product Data: Submit Manufacturer's data and installation instructions for each item, including dimensions and anchorage details.
- B. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.2 QUALITY ASSURANCE

- A. Standards: Comply with ANSI/UL 92 and 711.
- B. Regulatory Requirements: Conform to ANSI/NFPA 10 and the following:
 - 1. ANSI A117.1, 1998 "Accessible and Usable Buildings and Facilities."
 - 2. Public Law 101-336 "The Americans with Disabilities Act of 1990 (ADA)."
 - 3. ADA Accessibility Guidelines (ADAAG).

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Furnish products of one of the following Manufacturers, except as approved by the Architect and Resident Engineer, subject to compliance with Specification requirements:
 - 1. Amerex
 - 2. Larsen's Manufacturing Co. www.larsensmfg.com
 - 3. J.L. Industries www.jlindustries.com
 - 4. General
 - 5. Knox
 - 6. Supra Products Co.
 - 7. Or equal.

2.2 MATERIALS AND ACCESSORIES - GENERAL

- A. Fire suppression equipment shall not contain CFC's, HCFC's or Halons and shall comply with LEED-NC 2009 EQc3 requirements.

2.3 EQUIPMENT

- A. Multi-Purpose Dry Chemical Extinguisher:
 - 1. Capacity and UL Rating: 6 lbs., 3A-40B:C.
 - 2. Tank: DOT approved steel cylinder.
 - 3. Metal valves and siphon tube.
 - 4. Replaceable molded valve stem seal.
 - 5. Pressure gauge.

- B. Wall Bracket: Manufacturer's standard J-type for surface mounted fire extinguisher (SMFE).
- C. Fire Extinguisher Cabinet for recessed fire extinguisher (RFE):
 - 1. Trim Style and Projection: Recessed, 5/16".
 - 2. Inside box dimensions: As required for extinguisher.
 - 3. Door:
 - a. Vertical Duo with Clear Break Glass.
 - b. Trim and Door (Steel): One piece, constructed of cold-rolled steel with a standard white baked acrylic enamel finish suitable for field applied finish as specified in Section 09900. Doors to be tubular, hollow-metal design.
 - 4. Recessed Box: Heavy gauge, white baked acrylic enamel box
 - 5. Cabinet Signage: Horizontal lettering "FIRE EXTINGUISHER" on door; color as selected by Architect and Resident Engineer.
 - 6. Cabinet Mounting Hardware: Appropriate to cabinet.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other Work which affects, connects with, or will be concealed by this Work.

3.2 INSTALLATION

- A. Install items in accordance with Manufacturer's directions. Install cabinets plumb and level at heights shown on Drawings.
- B. Comply with regulatory requirements and anchor securely.
- C. Verify that extinguishers are charged and tagged.
- D. Place extinguishers in cabinets and on wall brackets.

3.3 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

SECTION 10 51 00

METAL LOCKERS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Locker room lockers.

1.2 SUBMITTALS

- A. Product data and installation instructions for locker units.
- B. Shop Drawings that show locker locations and relation to adjacent surfaces. Show lockers in detail, method of installation, fillers, trim, base, and accessories. Include locker numbering sequence information.
- C. Samples: Submit 2 samples or color chart for color selection(s).
- D. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 QUALITY ASSURANCE

- A. Uniformity: Provide lockers that are standard products of single manufacturer with interchangeable like parts. Include necessary mounting accessories, fittings, and fastenings.
- B. Regulatory Requirements:
 - 1. ANSI A117.1, 1998 "Accessible and Usable Buildings and Facilities."
 - 2. Public Law 101-336 "The Americans with Disabilities Act of 1990 (ADA)."
 - 3. ADA Accessibility Guidelines (ADAAG).
- C. Designated ADA compliant units shall be affixed with "handicap accessible" label on door.
- D. Shelf location and hook arrangements shall comply with ANSI standards and S.D.F.D. standards.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Do not deliver lockers until building is enclosed and ready for locker installation.
- C. Storage and Protection: Adequately protect against damage during delivery, handling, storage, and installation.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions shown on Drawings by taking field measurements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Furnish products of one of the following Manufacturers, except as approved by the Architect and Resident Engineer, subject to compliance with Specification requirements:
1. ASI Storage Solutions www.asilockers.com
 2. Lyon Metal Products www.lyonmetal.com
 3. Republic Storage Systems www.republicstorage.com
 4. Or equal.

2.2 MATERIALS AND ACCESSORIES - GENERAL

- A. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.

2.3 LOCKERS

- A. Locker Room lockers: Heavy duty, non-rusting, 45% ventilated metal or other types of industrial material lockers (thermal plastic or others), 24 inches by 24 inches by 72 inches; 16 gauge steel, flat tops, bottoms and sides, 14 gauge steel doors with recessed handles with padlock attachment, and space for name tag. The lockers shall have a shelf at the top and three (3) each paired hooks, one on each side and one on the back.
- B. Dorm Room lockers: Custom millwork in accordance with Section 06 40 00 – Architectural Woodwork and as per drawings. Lockers shall meet standard S.D.F.D personnel locker specifications. Provide a padlock eye set Master 60.
- C. Trim: Furnish with 4 inch high Zee Base, and with fillers at front surfaces to close space between lockers and wall surfaces where required and end finishing panels.
- D. Finish:
1. Provide manufacturer standard thermal-cured enamel or polyester powder coating.
 2. Color: As selected by Architect and Resident Engineer.

3.1 EXAMINATION

- A. Verification of Conditions:
1. Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
 2. Verify that prepared bases are in correct position and properly sized.

3.2 INSTALLATION

- A. Assemble and install lockers in accordance with Manufacturer's recommendations and approved Shop Drawings.
- B. Install plumb and square and fasten units together with bolts as standard with manufacturer.
1. Secure units to wall through back of units to solid blocking or studs or other solid structure with suitable anchors to resist 100 pounds pullout force.
 2. Anchor units through locker floor to base.

- C. Install end panels, corners, fillers and caps. Size trim units in field and scribe to adjacent surfaces.
- D. Install number plates after installation to assure proper number sequence.
- E. Verify doors and latches operate properly without binding.
- F. Touch up minor blemishes as approved. Verify that doors and latches operate easily and properly.

3.3 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

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SECTION 10 56 13
METAL STORAGE SHELVING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal storage shelving.
- B. Shelving accessories.

1.2 RELATED REQUIREMENTS

- A. Section 092116 - Gypsum Board Assemblies: Blocking and reinforcement in walls for anchoring shelving units.

1.3 REFERENCE STANDARDS

- A. ANSI MH28.1 - American National Standard for the Design, Testing, Utilization and Application of Industrial Grade Steel Shelving - Specifications; 1997.
- B. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; American Society of Civil Engineers; 2011.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Rated uniform shelf loads.
 - 2. Details of shelving assemblies, including reinforcement.
 - 3. Accessories.
 - 4. Substrate preparation instructions and recommendations.
 - 5. Storage and handling requirements and recommendations.
 - 6. Installation methods.
 - 7. Specimen warranty.
 - 8. Maintenance methods.
- C. Test Reports: Provide independent agency test reports documenting compliance with specified structural requirements.
 - 1. In lieu of test reports, detailed drawings stamped and sealed by a Professional Engineer licensed in the State in which the Project is located will be acceptable.
- D. Shop Drawings: Indicate location, type, and layout of shelving, including lengths, heights, and aisle layout, and relationship to adjacent construction.
 - 1. Indicate methods of achieving specified anchoring requirements.
- E. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and finishes.
- F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Shelves: Two of each size, with shelf brackets.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section, with not less than two years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Inspect for dents, scratches, or other damage. Replace damaged units.
- B. Store in manufacturer's unopened packaging until ready for installation.
- C. Store under cover and elevated above grade.

1.7 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide one year manufacturer warranty covering defects of manufacturing and workmanship and rust and corrosion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Manufacturers - Four Post Shelving:
 - 1. Lyon; Series 8000: www.lyon-my.com
- B. Acceptable Manufacturers - Case Type Shelving:
 - 1. Lyon; Series 8000: www.lyon-my.com

2.2 SHELVING - GENERAL

- A. See Drawings for layout and sizes.
- B. Shelving: Provide products tested to comply with ANSI MH28.1 for design criteria, lateral stability, shelf connections, and shelf capacity.
- C. Seismic Design: Design for Seismic Zone 3, in accordance with ASCE 7, Section 9.
- D. Anchors: Provide anchoring hardware to secure each shelving unit to floor and wall.
 - 1. Provide hardware of type recommended by manufacturer for substrate.
 - 2. See Drawings for additional details of anchorage.

2.3 FOUR POST SHELVING

- A. Four Post Shelving: Steel post-and-beam type with sway bracing, shelving brackets, shelving surfaces, and accessories as specified.
 - 1. Unit Width: 48 inches (1220 mm), center to center of posts.
 - 2. Shelf Capacity:
 - a. Type 1: 600 pounds per shelf, minimum.
 - b. Type 2: 900 pounds per shelf, minimum.
 - 3. Shelf Deflection: 1/4 inch (6 mm) in 36 inches (914 mm), maximum, under rated uniform load.
 - 4. Shelf Deflection: L/140, maximum, under rated uniform load.
 - 5. Adjustability of Shelving: At intervals of 6 inches (150 mm) on center, minimum.
 - 6. Shelf Depth: 24 inches (609.6 mm), minimum.
 - 7. Unit Depth: Not more than 1/4 inch (6 mm) greater than shelf depth.
 - 8. Shelves per Unit: As indicated on Drawings.
 - 9. Finish: Baked enamel, medium gloss.
 - 10. Number of Units: As indicated on Drawings.
- B. Posts and Beams: Formed sheet members; perforations exposed on face of members are not acceptable.
 - 1. Metal Thickness: 16 gage, 0.0598 inch (1.52 mm).
 - 2. Post Shape: Tee intermediate posts, angle end posts forming corners.
 - 3. Post Face Width: 2 inches (51 mm), maximum.

4. Connecting Hardware: Manufacturer's standard.
5. Post Bases: Flat steel foot plate, with manufacturer's recommended adjustable leveling device.

C. Bracing: Formed sheet members.

1. Back Sway Bracing: Either strap or panel; at back of each unit.
2. Side Sway Bracing: Either strap or panel; at each side of each unit.
3. Strap Sway Bracing: One strap installed diagonally, 16 gage, 0.0598 inch (1.52 mm); welded, riveted, or bolted to uprights.
4. Panel Sway Bracing: Formed sheet metal panels, 20 gage, 0.0359 inch (0.91 mm); welded, riveted, or bolted to uprights.

2.4 CASE TYPE SHELVING

A. Case Type Shelving: Steel, closed back and sides, with shelving brackets, shelving surfaces, and accessories as specified.

1. Unit Width: 48 inches (1220 mm), overall.
2. Shelf Capacity:
 - a. Type 1: 600 pounds per shelf, minimum.
 - b. Type 2: 900 pounds per shelf, minimum.
3. Shelf Deflection: 1/4 inch (6 mm) in 36 inches (914 mm), maximum, under rated uniform load.
4. Shelf Deflection: L/140, maximum, under rated uniform load.
5. Adjustability of Shelving: At intervals of 6 inches (150 mm) on center.
6. Shelf Depth: 24 inches (609.6 mm), minimum.
7. Unit Depth: Not more than 1/4 inch (6 mm) greater than shelf depth.
8. Finish: Baked enamel, medium gloss.

B. Case Construction: Formed sheet metal comprising vertical support members and enclosure panels.

1. Shelf Support Members: 16 gage, 0.0598 inch (1.52 mm), minimum; manufacturer's standard profile.
2. Face Width of Exposed Vertical Supports: 2 inches (51 mm), maximum.
3. Panels: 24 gage, 0.0239 inch (0.61 mm), minimum.
4. Provide panels at intermediate divisions as well as ends and backs.
5. Provide canopy tops of same construction as shelves.
6. Connecting Hardware: Manufacturer's standard.

C. Shelves: Formed sheet metal, finished on all surfaces, with slots for dividers.

1. Thickness: 16 gage, 0.0598 inch (1.52 mm), minimum.
2. Shelf Edge Profile: Extending 3/4 inch (19 mm), maximum, below top surface of shelf.
3. Shelf Connection to Posts: Manufacturer's standard.

2.5 ACCESSORIES

A. Kick Plates: Formed sheet metal; enclose open space between bottom shelf and floor on all front sides and open ends; finished to match.

B. Drawers: Formed steel, with mounting brackets and earthquake stops.

END OF SECTION

SECTION 10 71 13.43
FIXED SUN SCREENS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Modular, shop fabricated, steel sun screens.
- B. Attachment hardware.

1.2 RELATED REQUIREMENTS

- A. Section 055000 - Metal Fabrications.
- B. Section 061000 - Rough Carpentry for framing.

1.3 REFERENCE STANDARDS

- A. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength; 2014.
- B. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs; 2013a.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate installation of sun control devices with Section 092400.
- B. Preinstallation Meeting: Convene one week before starting work of this Section.
 - 1. Convene under general provisions of Section 017000.
 - 2. Require attendance of sunshade manufacturer, installer, and other affected trades. Prior to fabrication, determine if the specified devices can be fabricated from "guaranteed dimensions" provided by Contractor, or if field dimensions taken by the installer will be applicable.

1.5 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Prior to commencement of fabrication, submit detailed shop drawings, showing all profiles, sections of all components, finishes, fastening details, and manufacturer's technical and descriptive data. Include field dimensions of openings and elevations on shop drawings.
- C. Samples: 10 inches (254 mm) by 10 inches (254 mm) minimum illustrating design, workmanship and finish color.
- D. Sample of Louver: For review of shape only.
- E. Specimen Warranty: Furnish a copy of manufacturer's standard warranty.
- F. Installer Qualification Statement.

1.6 SUSTAINABILITY SUBMITTALS

- A. LEED Submittals: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
 - 1. Product Data for Credit MR 4.1 and MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

2. Product Certificates for Credit MR 5.1 and MR 5.2: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction byweight that is considered regional.
 - a. Include statement indicating distance from manufacturer to Project for each regionally manufactured material.
 - b. Include statement indicating location of and distance from Project to point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials.
 3. LEED Credit EQ 4.1: Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.
 4. LEED Credit EQ 4.2: Product data for paints and coatings used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.
- B. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green for the following measures:
1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 3. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section, with no less than two years of documented experience.
 1. Provide sunshades manufactured by a single manufacturer.
- B. Installer Qualifications: Company specializing in performing the work of this Section.
 1. With minimum two years of documented experience.
 2. Approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site ready for erection.
- B. Package using methods that prevent damage during shipping and storage on site.
 1. Protect finished aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond to aluminum when exposed to sunlight or weather.
- C. Store materials under cover and elevated above grade.

1.9 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Sun Screens: Correct defective work within a one year period after date of Substantial Completion.
- C. Finish Warranty: Provide manufacturer's two year warranty on factory finish against cracking, peeling, and blistering.

PART 2 PRODUCTS

2.1 SUN SCREENS

- A. Sun Screens: Shop fabricated, shop primed, steel, louvers, and fascia, free of defects impairing strength, durability or appearance.
 1. Configuration: As indicated on Drawings.
 2. Blade Type: Tube, size as indicated on Drawings.

3. Outrigger Shape: Straight.
4. Sizes: As indicated on Drawings.
5. Provide a complete system ready for erection at project site.
6. Shop fabricate to the greatest extent possible; disassemble if necessary for shipping.

2.2 MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.
- B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
- C. Plates: ASTM A283.
- D. Fasteners: As detailed or required for indicated applications.
- E. Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, galvanized to ASTM A153/A153M where connecting galvanized components.
- F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- G. Fasteners: ASTM F593 stainless steel .
- H. Anchors and Inserts: Use non-Ferrous metal or hot dip galvanized anchors and inserts for installation and elsewhere as required for corrosion resistance. Use stainless steel or lead expansion bolt devices for drill-in place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.3 PRIMERS

- A. Paint Maximum Product Emissions Limits: Top coat and primer interior paints must meet current requirements for VOC (Volatile Organic Compounds) limits of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.
 1. Cal-GREEN Requirements for typical paint coatings:
 - a. Primers, Sealers, and Undercoaters: 100 grams per liter of product minus water.
- B. Exterior Galvanized Metal Primer: Factory-formulated galvanized metal primer for exterior application.
 1. Dunn-Edwards Corporation; UGPR00-1 Ultra-Grip Premium, Ultra-Low VOC, Interior/Exterior Acrylic Multi-Surface Primer: Applied at a dry film thickness of not less than 1.5 mils.
 2. Glidden Professional; 4020-XXXX Devflex DTM Flat Interior/Exterior Waterborne Primer & Finish: Applied at a dry film thickness of not less than 2.2 mils.
 3. Sherwin-Williams; S-W Pro Industrial ProCryl Universal Acrylic Primer, B66W310. Applied at a dry film thickness of not less than 3.0 mils.
 4. Tnemec:
 - a. Under Acrylics: Series 115 Uni-Bond DF; Applied at a dry film thickness rate of not less than 3.0 mils.

2.4 FASTENERS

- A. Fastener Materials: Unless otherwise indicated, provide the following:
 1. Interior Aluminum Components: Type 304 stainless-steel fasteners.
 2. Exterior Aluminum Components: Type 316 stainless-steel fasteners.
 3. Interior Stainless-Steel Components: Type 304 stainless-steel fasteners.
 4. Exterior Stainless-Steel Components: Type 304 stainless-steel fasteners.
 5. Uncoated Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed; Type 304 stainless-steel fasteners where exposed.
 6. Galvanized-Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.

7. Dissimilar Metals: Type 304 stainless-steel fasteners.

- B. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads .
- C. ICC-ES AC193 is for mechanical anchors and ICC-ES AC308 is for adhesive anchors.
- D. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 .
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 (A4) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.5 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by continuous welds.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Miter exposed joints.
- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- G. Weld in accord with AWS D1.1 for materials being welded.
- H. Ease exposed edges to a minimum, uniform radius of 1/32 inch.
- I. Fit and shop assemble sections in largest sizes practical for site delivery.
- J. Fabricate work to exclude rain and condensate or provide weep holes to divert water to the exterior.
- K. Form break metal corners to the smallest radius possible without distressing the finish surface.
- L. Cut, drill, punch, tap, reinforce and provide anchors to accommodate adjoining work and hardware.
- M. Provide anchors, bolts, rough hardware, fasteners and accessories required to incorporate and secure fabrications and to make the units functionally operational.
- N. Use countersunk, flat head screws and bolts at exposed joints requiring mechanical fasteners.
- O. At exposed work, use materials which are smooth, free of surface blemishes, pitting, seam marks, roller marks, trade names and roughness.

2.6 FINISHES - STEEL

- A. General:
 - 1. Prepare surfaces to be primed in accordance with SSPC-SP6, or as recommended by finish coating manufacturer.
 - 2. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Prime paint all steel items, unless otherwise specified.
 - 1. Prime Painting: One coat.

- C. Galvanizing: Galvanize after fabrication to ASTM A123/A123M requirements.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and site area for conditions that might prevent satisfactory installation.
- B. Verify that dimensions of supporting structure are within plus/minus 1/8 inch (3.175 mm) of dimensions shown on shop drawings.
- C. Verify that all adjacent painting, roofing, masonry work, and other work that might damage sun screen finish has been completed prior to installation of sun screens.
- D. Do not install until after all adjacent painting, roofing and masonry have been completed.
- E. Do not proceed with installation until all conditions are satisfactory.

3.2 INSTALLATION

- A. Set units level, plumb, with uniform joints, and aligned with building elements.
- B. Separate dissimilar metals using concealed bituminous paint or non-absorbent gasket.
- C. Anchor units to structure as indicated on the drawings.
- D. Do not cut or trim aluminum members without approval of manufacturer; do not install damaged members.
- E. Touch-up damaged finish coating using material provided by manufacturer to match original coating.

3.3 TOLERANCES

- A. Maximum Misalignment of Two Adjacent Members in Plane: 1/8 inch (3.175 mm).
- B. Maximum Variation from Level: Plus/Minus 1/8 inch (3.175 mm).

3.4 CLEANING

- A. Clean exterior surfaces units of dust and debris; follow manufacturer's cleaning instructions for the finish used.
- B. Remove protective material from pre-finished aluminum surfaces.
- C. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- D. Remove excess sealant by method acceptable to sealant manufacturer.
- E. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.5 PROTECTION

- A. Protect units after installation to prevent damage due to other work until Date of Substantial Completion.

END OF SECTION

SECTION 10 75 00

FLAGPOLES

PART 1 GENERAL

1.1 SYSTEM DESCRIPTION

- A. Design Requirements: Comply with National Association of Architectural Metal Manufacturer's "Guide Specifications for the Design of Metal Flagpoles," Standard FP-1.

1.2 SUBMITTALS

- A. Shop Drawings: Submit Drawings showing sizes, finishes, methods of installation and accessories.
- B. Samples: Submit samples showing material and finish.
- C. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact. Protect finished surfaces with removable wrapping or coating which will not bond when exposed to sunlight.
- B. Storage: Adequately protect against damage while stored at the site.

PART 2 PRODUCTS

2.1 FLAGPOLES

- A. General: Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
- B. Pole: Custom, as detailed on Drawings.
 - 1. Material: Aluminum, seamless cold drawn ASTM B241, 6063-T6 aluminum tubing with 0.188 inch wall thickness.
 - 2. Height as indicated on Drawings.
- C. Accessories: Equip pole with the following:
 - 1. 14 gage aluminum ball, diameter sized to be compatible for height of pole.
 - 2. Internal Halyard Fittings: Manufacturer's standard cable based internal halyard system with locking door and reinforced door frame assembly.
 - 3. Truck Assembly: Revolving truck assembly.
- D. Anodized Finish: Manufacturer's standard clear anodized finish, meeting AA M32-C22-A41.
- E. Structural attachment to building: As detailed on Drawings. Provide metal fabrication materials in accordance with Section 05 50 00 and as shown on Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.

3.2 INSTALLATION

- A. Install flagpole, base assembly, and fittings in accordance with Manufacturer's instructions.
- B. Electrically ground flagpole installation.

3.4 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

SECTION 10 82 00
ROOF TOP EQUIPMENT SCREENS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pre-formed thermoplastic panel for enclosing roof top mechanical equipment.
 - 2. Aluminum assembly framing for direct attachment of screening panels to mechanical equipment; no base or curb required unless shown otherwise on drawings.
 - 3. Sliding panels to permit easy access to mechanical equipment for servicing.
- B. Products Not Installed or Furnished in This Section:
 - 1. Touch-up painting required for scratches and screwheads.
 - 2. Field painting of prime painted screens

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Products: Envisor Screening System by CityScapes Incorporated, 4200 Lyman Ct. Hilliard, OH 43026. 1-877-727-3367 www.cityscapesinc.com
- B. Substitutions: Submit in accordance with Section 01 25 00 [01600].

2.2 MATERIALS

- A. Thermoformed Plastic Panels: Fabricated from rigid medium impact thermo-formed ABS (Acrylic Butylene Styrene) sheets.
 - 1. Minimum thickness: 3/16 inch (18mm).
- B. Framing: Aluminum Plate, Shapes and Bar: ASTM B 221, alloy 6061-T5 or 6063-T5.
- C. Threaded Fasteners: All screws, bolts, nut and washers shall be Stainless steel.
 - 1. Corner assembly fasteners shall be #10-16 x stainless steel TEK screws. Length as required to develop full holding capacity of screw when fastened to Mechanical Equipment.
 - 2. Provide lock washer or other locking device at all bolted connections.

2.3 FABRICATION

- A. Provide factory-formed panel systems with continuous interlocking panel connections and indicated or necessary components: Form all components true to shape, accurate in size, square and free from distortion or defects. Cut panels to precise lengths indicated on approved shop drawings.
- B. Fabricate all panels to slide horizontally to allow access to unit access panels behind.
- C. Panel Design, Style, Trim:
 - 1. Panel Style: Vertical
 - 2. Panel Design: Louver Pan
 - 3. Decorative Top Trim Profile: Flat
- D. Trim and Closures: Fabricated from 24 gage metal, and finished with the manufacturers standard coating system, unless shown otherwise on drawings.
- E. Framing: Fabricate and assemble components in largest practical sizes, for delivery to the site.
 - 1. Construct corner assemblies to required shape with joints tightly fitted.
 - 2. Supply components required for anchorage of framing. Fabricate anchors and related components of material and finish as required, or as specifically noted.

2.4 FINISHES

- A. Aluminum Framing: Mill finish.
- B. Panel Coating: Manufacturer's standard coating system, factory-applied.
 - 1. Color: Custom color as selected by Architect to match existing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Installer's Examination: Examine conditions under which construction activities of this section are to be performed.
 - 1. Submit written notification to Architect and Screen manufacturer if such conditions are unacceptable.
 - 2. Beginning erection constitutes installer's acceptance of conditions.

3.2 INSTALLATION

- A. Install units in accordance with the manufacturer's instructions and approved shop drawings. Keep perimeter lines straight, plumb, and level. Provide brackets, anchors, and accessories necessary for a complete installation.
- B. Fasten structural supports to HVAC units without damaging operation of the unit.
 - 1. Provide corner and mid-span assemblies as required by approved shop drawings so that the panels are supported uniformly.
 - 2. Fastening bottom rail using bolts to permit ease of access to HVAC units.
- C. Insert thermoplastic panels into structural supports, except where fixed attachment points are indicated. Butt thermoplastic panels to adjacent panels for uniform fit. Fasten fixed panels in accordance with the shop drawings.
- D. Metal Separation: Where aluminum materials would contact dissimilar materials, insert rubber grommets at attachment points, thus eliminating where dissimilar metals would otherwise be in contact.
- E. Do not cut or abrade finishes which cannot be restored. Return items with such finishes to shop for required alterations.

3.3 ERECTION TOLERANCES

- A. Maximum misalignment from true position: ¼ inch (12 mm).

3.4 CLEANING AND PROTECTION

- A. Remove all protective masking from material immediately after installation.
- B. Protection:
 - 1. Ensure that finishes and structure of installed systems are not damaged by subsequent construction activities.
 - 2. If minor damage to finishes occurs, repair damage in accordance with manufacturer's recommendations; provide replacement components if repaired finishes are unacceptable to Architect.
- C. Prior to Substantial Completion: Remove dust or other foreign matter from component surfaces; clean finishes in accordance with manufacturer's instructions.
 - 1. Clean units in accordance with the manufacturer's instructions.

END OF SECTION

SECTION 11 11 36
VEHICLE CHARGING EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

- A. The extent and locations of packaged bollard mounted electric vehicle charging stations are shown on Drawings, and include devices for anchorage of electric vehicle charging stations to substrates.
 - 1. Division 03 - Concrete Section.
 - 2. Division 26 – Electrical: Power for charging stations.
- B. Related Requirements:
 - 1. Division 03 - Concrete Section
 - 2. Division 26 – Electrical: Power for charging stations.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Inspect and discuss electrical roughing-in, equipment bases, and other preparatory work specified elsewhere.
 - 2. Verify that equipment operation is consistent with system description.
 - 3. Review required testing, inspecting, and certifying procedures.

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 vehicle charging equipment.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties.
- B. Shop Drawings: For parking control equipment.
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Indicate layout, bollard foundation, electrical box and connection to power supply, and accessories, fittings, and anchorage.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Field quality-control reports.
- C. Certifications specified in Quality Assurance article.
- D. Qualification Data: Manufacturer's and installer's qualification data.
- E. Manufacturer's instructions.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For vehicle charging equipment to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Manufacturer Qualifications: Minimum two years experience in production of electric vehicle charging stations.
- C. Certifications: Manufacturer's certification that products furnished for Project meet or exceed specified requirements.
- D. Single Source Responsibility: Provide electric vehicle charging stations as complete units from single source including necessary bollards, accessories, fittings, and fastenings.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain vehicle charging equipment from single source from single manufacturer.
- B. Basis-of-Design Product: ChargePoint Charging Stations; CT4021 Family or prior approved equal.
- C. Electric Vehicle Charging Stations:
 - 1. Bollard mounted unit.
 - 2. Charging stations shall provide 7.2 kW (208/240 V @ 30 A) charging for public outdoor applications for the North American marketplace.
 - 3. Charging shall be delivered via two standard SAE J1772™ connectors and 23-foot cables.
 - 4. Drivers access and energize station using ChargePoint Network card or contactless credit card.
 - 5. Provide highly visible display to guide users with instructive messages.
 - 6. Message bar capable of displaying custom advertisement or greetings for users.
 - 7. Provide with access and network features that can be modified to suit Owner specific application needs.
- D. Vacuum Fluorescent Display With Multiple Language Support: Bright, easy-to-read display is used for instructive, advertisement and greeting messages in many languages.
- E. Integrated Fault Detection:
 - 1. Ground fault detection: Integrated ground-fault detection circuitry with auto retry and driver notification is standard.
 - 2. Over-current detection: The charger disconnects power to prevent nuisance breaker trips at the service panel. Auto retry and driver notification are automated.
 - 3. Plug-out detection: An algorithm disengages power and notifies the driver when a plug is removed.
 - 4. Charging complete detection: An algorithm detects completion of EV charge and notifies the driver.
- F. Electrical Input:
 - 1. Input power: 7.2 kW
 - 2. Input voltage: 208/240 VAC
 - 3. Input current: 30 A
 - 4. Input power connections: Line 1, Line 2, Earth
 - 5. Recommended service panel breaker: 40 A double pole breaker (non-GFCI type) on dedicated circuit.
 - 6. Standby power: 5 W typical
- G. Electrical Output:
 - 1. Output charging power: 7.2 kW

2. Output voltage 240 VAC
3. Output current 30 A.
4. Output charging connector: SAE J1772™ EV connector on 23' (7.01 m) cable

H. Functional Interfaces:

1. Card reader: ISO 15693, 14443.
2. Ground fault detection: 20 mA CCID with auto retry (15-minute delay, 3 tries)
3. Plug-out detection: Power terminated per SAE J1772™ specification.
4. Power measurement: 2% @ 5-minute intervals
5. Local area network: 2.4 GHz 802.15.4 dynamic mesh network.
6. Wide area network: Commercial CDMA or GPRS cellular data network.

I. Safety And Operational Ratings:

1. Safety compliance: Complies with UL 2594, UL 2231-1, UL 2231-2, UL 1998, NFPA 70, NEC Article 625
2. Surge protection: 6 kV @ 3,000 A. In geographic areas subject to frequent thunderstorms, supplemental surge protection is recommended.
3. EMC compliance: FCC Part 15 Class A.
4. Operating temperature: -22 °F to 122 °F (-30 °C to +50 °C)*
5. Operating humidity: 95% non-condensing.
6. Enclosure NEMA 3R per NEMA 250-1997.
7. Terminal block temperature rating: 100 °C (212 °F).
8. Maximum charging stations per 802.15.4 radio group: 24. Each station must be within 150 feet "line of sight" of a gateway station.
9. Approximate shipping weights Bollard 77 lbs (34 kg).

2.2 ANCHORAGES

- A. Anchor bolts; hot-dip galvanized according to ASTM A 153/A 153M and ASTM F 2329.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, including equipment bases; accurate placement, pattern, and orientation of anchor bolts; critical dimensions; and other conditions affecting performance of the Work.
- B. Examine roughing-in for electrical and communication systems to verify actual locations of connections before vehicle charging equipment installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Excavation for Vehicle Charging Stations: Saw cut existing pavement for recessed traffic controllers and hand-excavate recesses to dimensions and depths and at locations as required by traffic controller manufacturer's written instructions and as indicated on Drawings.

3.3 INSTALLATION

- A. General: Install vehicle charging equipment as required for complete installation.
 1. Rough-in electrical connections.
- B. Install electric vehicle charging stations plumb, level and secure.
- C. Attach hardware by means which will prevent unauthorized removal.
- D. Connect to power supply.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform the following tests and inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 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.
- D. Vehicle charging equipment will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

3.5 ADJUSTING

- A. Adjust vehicle charging equipment to function smoothly.

3.6 PROTECTION

- A. Remove barrier gate arms during the construction period to prevent damage, and install them immediately before Substantial Completion.

3.7 DEMONSTRATION

- A. [Engage a factory-authorized service representative to train] [Train] Owner's maintenance personnel to adjust, operate, and maintain parking control equipment.

END OF SECTION

SECTION 11 15 00
SECURITY GATES AND FENCES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included:
 - 1. Fences.
 - 2. Parking gates.
 - 3. Controls and safety devices.

- B. Related work:
 - 1. Chain link fencing and gates.
 - 2. Wrought iron fencing and gates.
 - 3. Metal fabrications.
 - 4. Painting.
 - 5. 120V A.C., 1 phase, 60 Hz, 20 amp dedicated electrical circuit to the operator control boxes.

1.2 QUALITY ASSURANCE

- A. Comply with requirements of Section 01400.

- B. Acceptable manufacturer and installer: Gate Controls, Inc., 2334 E. 8th Street, Los Angeles, California 90021, (213) 623-2151, or Owner/Architect-approved equal.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Comply with requirements of Section 01600.

1.4 WARRANTY

- A. All materials: 1 year from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Apply full welds, grind and polish.

- B. Degrease, prime with manufacturer's standard primer and finish paint as required by Section 09900.

- C. Color: As selected by Architect.

2.2 GATE AND PANELS

- A. Side panels and fences:
 - 1. Construct of the same materials and in the same manner as the gates.
 - 2. Side panels and fences shall have posts of 4" (w/cap), 11 ga. stock.

B. Parking lot gates and fences

1. Located at lower parking lot and side entry.
2. Galv. Steel tube w/vertical pickets, 4.5" on center maximum.
3. Swing gates.

2.3 HARDWARE

A. Swinging security panels:

1. Two G.C.I. H.D. lap hinges with 10" long barrels, 1-3/4" diameter complete with grease fittings welded to each gate and hinge post.
2. Hinge posts: 4" sq., 11 ga. steel buried in 24" of concrete. See landscapedrawings.

2.4 CONTROLS

- A. Digital control: Programmable digital control in weatherproof housing, post mounted.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install in strict accordance with all pertinent codes, regulations and manufacturer's recommendations.

3.2 TESTS

- A. Upon completion of the installation, put all components through at least twelve complete cycles of operation. Make required adjustments to assure optimum operating efficiency.

END OF SECTION

SECTION 11 31 00
RESIDENTIAL EQUIPMENT

PART 1 GENERAL

1.1 SUBMITTALS

- A. Product Data: Submit Manufacturer's specifications and installation instructions.
- B. Shop Drawings: Submit drawings showing space requirements, and piping and wiring rough-in locations for gas, water, power, and for ductwork.
- C. Samples: Submit samples or brochures showing color selection.
- D. Operating and Maintenance: Submit 2 copies of Manufacturer's instructions for operating and maintaining equipment.
- E. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.2 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Storage: Adequately protect against damage while stored at the site.
- C. Handling: Comply with Manufacturer's instructions.

1.3 WARRANTY

- A. Furnish Manufacturer's standard 2 year warranty for each item of equipment.

PART 2 PRODUCTS

2.1 MATERIALS, EQUIPMENT AND ACCESSORIES - GENERAL

- A. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
- B. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
- C. Refrigeration equipment shall not contain HCFC's or Halons.
- D. Appliances shall comply with CALGreen section 5.210.1

2.2 EQUIPMENT

- A. Dishwasher: Fire-Rescue Department will furnish dishwasher, Owner-Furnished, Contractor-Installed (OFCl).
- B. Refrigerators: Fire-Rescue Department will furnish refrigerators, Owner-Furnished, Contractor-Installed (OFCl).
- C. Gas Range and Oven: Fire-Rescue Department will furnish gas range and oven, Owner-Furnished, Contractor-Installed (OFCl).
- D. Microwave Oven: Fire-Rescue Department will furnish microwave oven, Owner-Furnished, Contractor-Installed (OFCl).
- E. Range Hood:
 - 1. Stainless steel commercial grade sized to extend 6 inches beyond each stove edge (varies by stove model). A 60 inch range shall be provided and the hood shall be compatible with BTU output of the provided range.
 - 2. Range hood shall include two (2) lights, a two-speed, roof-mounted exhaust fan with a ¾ HP motor capable of proper CFM, and removable washable stainless steel filter screens.
 - 3. The hood shall conform to Health Code, I.B.C, I.M.C, and N.E.C. as adopted by the City and County of San Diego.
- F. Refrigerators, washer & dryer (gas) in clean room: Owner-Furnished, Contractor-Installed (OFCl).
- G. Exterior gas barbecue: Owner-Furnished, Contractor-Installed (OFCl).
- H. Garbage Disposer: In-Sink-Erator, Evolution Essential® Model, 3/4 HP, 120 V, single phase, 8.1 amp, provide with cord kit option.
- I. Colors: Provide manufacturer's standard colors. "Black" or "Stainless Steel" unless otherwise noted as selected by Architect and Resident Engineer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other work which affects, connects with, or will be concealed by this Work.

3.2 INSTALLATION

- A. Install equipment at locations shown on Drawings in accordance with Manufacturer's instructions.

- B. Contractor shall provide the following for residential equipment:
 - 1. Water supply for icemakers and electrical outlets and ventilation for four (4) 36" wide refrigerators.
 - 2. Gas supply and electrical outlets as required for 60 inch wide heavy duty gas range and oven. Clearance on each side of the range shall be a minimum of 6 inches and adjacent cabinets and rear wall shall be covered in stainless steel as specified in Section 05 70 00.
 - 3. Gas outlet and electrical outlet for barbeque.
 - 4. Electrical outlet in upper cabinet for microwave oven.
- C. Connect equipment to power, water and ductwork rough-ins as applicable. Securely fasten built-in items where required.

3.3 FIELD QUALITY CONTROL

- A. Tests: Test each item for proper operation. Check and adjust oven thermostats for correct temperature.

3.4 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

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SECTION 12 21 00

BLINDS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Horizontal Blinds as shown on the Drawings and as specified.

1.2 SUBMITTALS

- A. Samples: Submit samples of blind materials, colors and patterns.
- B. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Storage and Protection: Adequately protect against damage while stored at the site.
- C. Handling: Comply with Manufacturer's instructions.

1.4 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions shown on Drawings by taking field measurements; proper fit and attachment of parts is required.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Furnish products of one of the following Manufacturers, except as otherwise specified approved by the Architect and Resident Engineer, subject to compliance with Specification requirements:
 1. Levolor Corporation www.levolor.com
 2. Hunter Douglas Inc. www.hunterdouglas.com
 3. Carey-McFall Corporation (Bali), Div. Springs Industries
 4. Or equal.

2.2 MATERIALS AND ACCESSORIES - GENERAL

- A. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
- B. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.

2.3 HORIZONTAL MINI-BLINDS

- A. Levolor Riviera Contract, or equal.
 - 1. Slats: 5000 Series magnesium aluminum alloy only, not to include reprocessed metals. Nominally 1.00 inches plus or minus .003 inch wide, and .0075 inch plus or minus .0003 inch thick (prior to coating); after coating, the thickness of the slats shall be nominally .0085 inch. Slats shall be unperforated.
 - 2. Headrail: .025 inch thick Tomized steel, "U" shaped, 1 inch high x 1-9/16 inches wide. Enclose hardware in metal headrail.
 - 3. Valance: Provide matching 1 inch slat valance with clips for attachment to headrail.
 - 4. Tilter Mechanism: .042 inch thick Tomized steel housing with a self-lubricating nylon, automatically disengaging worm and gear mechanism to eliminate overdrive.
 - a. Location: As selected by Architect and Resident Engineer.
 - 5. Tilt Wands: Transparent with a hexagonal cross section 5/16 inch across flats.
 - 6. Cord Lock: .042 inch thick Tomized steel and shall be crash proof.
 - 7. Drum and Cradle: Provide for each ladder.
 - a. Drums: .031 inch thick Tomized steel.
 - b. Cradles: .042 inch thick Tomized steel.
 - 8. Brackets: Minimum .048 inch thick Tomized steel with a rivet-hinged safety locking front cover to permit removal of headrail without lateral movement.
 - 9. Ladders (slat supports): Distance between slats shall not exceed 14.2 slats per vertical foot.
 - 10. Bottom rail: .025 inch thick Tomized steel.
 - 11. Color: As selected by Architect and Resident Engineer from manufacturer's full range of available colors.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination with other Work: Coordinate with other Work which affects, connects with, or will be concealed by this Work.

3.2 INSTALLATION

- A. Install window blinds in strict accordance with Manufacturer's instructions. Install straight and plumb, securely fastened, and with horizontal lines level and true with window framing.
- B. Evidence of drilling, cutting and fitting to room finish shall be concealed in the finish work. Provide uniform clearance at edges not to exceed 3/16 inch. Adjust hardware for smooth operation.

- C. Install blinds between vertical window mullions with discontinuous head channel and slats, allowing independent blind operation for separate glazing units.

3.3 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

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SECTION 12 21 13
HORIZONTAL LOUVER BLINDS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Horizontal slat louver blinds.
- B. Operating hardware.

1.2 RELATED REQUIREMENTS

- A. Section 061000 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.

1.3 REFERENCE STANDARDS

- A. WCMA A100.1 - Safety of Corded Window Covering Products; Window Covering Manufacturers Association; 2012. (ANSI/WCMA A100.1).

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the placement of concealed blocking to support blinds. See Section 061000.

1.5 SUBMITTALS

- A. Product Data: Provide data indicating physical and dimensional characteristics.
- B. Shop Drawings: Indicate opening sizes, tolerances required, method of attachment, clearances, and operation.
- C. Samples: Submit two samples, 24 inch (____mm) long illustrating slat materials and finish, cord type and color.
- D. Manufacturer's Installation Instructions: Indicate special procedures.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Blind Assemblies: Two of each size.
 - 3. Extra Slats: 20 of each type and size.
 - 4. Extra Lift Cords, Control Cords, and Wands: One of each type.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum two years documented experience.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Horizontal Louver Blinds:
 - 1. Levolor Contract; Riviera Contract: www.levolorcontract.com.
 - 2. Prior approved equal.
 - 3. Other Acceptable Horizontal Louver Blinds:
 - a. Carey-McFall Corporation (Bali): www.hunterdouglas.com.
 - b. Hunter Douglas: www.hunterdouglas.com.
 - c. Prior approved equal.

2.2 BLINDS WITHOUT SIDE GUIDES

- A. Description: Horizontal slat louvers hung from full-width headrail with full-width bottom rail.
- B. Manual Operation: Control of raising and lowering by cord with full range locking; blade angle adjustable by control wand.
- C. Metal Slats: Spring tempered pre-finished aluminum; square slat corners, with manufacturing burrs removed.
 - 1. Width: 1 inch (25 mm).
 - 2. Thickness: 0.008 inch (0.20 mm).
 - 3. Color: As selected by Architect.
- D. Plastic Slats: PVC foam, square slat corners.
 - 1. Width: 2 inch (50 mm).
 - 2. Thickness: Manufacturer's standard.
 - 3. Color: As selected by Architect.
 - 4. Texture: Smooth.
- E. Slat Support: Woven polypropylene cord, ladder configuration.
- F. Head Rail: Pre-finished, formed aluminum box, with end caps; internally fitted with hardware, pulleys, and bearings for operation; same depth as width of slats.
 - 1. Height: 1 inches (25.4 mm).
 - 2. Color: Same as slats.
- G. Bottom Rail: Pre-finished, formed aluminum with top side shaped to match slat curvature; with end caps.
 - 1. Color: Same as headrail.
- H. Lift Cord: Braided nylon; continuous loop; complying with WCMA A100.1.
 - 1. Free end weighted.
 - 2. Color: Manufacturer's standard.
- I. Control Wand: Extruded hollow plastic; hexagonal shape.
 - 1. Non-removable type.
 - 2. Length of window opening height less 3 inch (76 mm).
 - 3. Color: Clear.
- J. Headrail Attachment: Wall brackets.
- K. Accessory Hardware: Type recommended by blind manufacturer.

2.3 FABRICATION

- A. Determine sizes by field measurement.
- B. Fabricate blinds to fit within openings with uniform edge clearance.
- C. Fabricate blinds to cover window frames completely.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that openings are ready to receive the work.
- B. Ensure structural blocking and supports are correctly placed. See Section 061000.

3.2 INSTALLATION

- A. Install blinds in accordance with manufacturer's instructions.

- B. Secure in place with flush countersunk fasteners.
- C. Place intermediate head supports at 48 inch (1220 mm) on center, maximum.

3.3 TOLERANCES

- A. Maximum Variation of Gap at Window Opening Perimeter: 1/4 inch (6 mm).
- B. Maximum Offset From Level: 1/8 inch (3 mm).

3.4 ADJUSTING

- A. Adjust blinds for smooth operation.

3.5 CLEANING

- A. Clean blind surfaces just prior to occupancy.

END OF SECTION

SECTION 12 21 16
VERTICAL LOUVER BLINDS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Vertical louver blinds at all locations indicated on Drawings.

1.2 RELATED REQUIREMENTS

- A. Section 122113 - Horizontal Louver Blinds.

1.3 DEFINITIONS

- A. Light and Privacy Scale:
 1. Level One (1): Reduces glare and still reveals considerable details to the outside, provides no privacy.
 2. Level Two (2): Softens the light and still reveals some details to the outside. Provides moderate privacy.
 3. Level Three (3): Softens the light but reveals shadow-like outlines to the outside, provides substantial privacy.
 4. Level Four (4): Diffuses the light and reveals no shape or details to the outside. Provides complete privacy and room-darkening options.
 5. Level Five (5): Blocks virtually all the light and provides the most privacy and light control available.

1.4 REFERENCE STANDARDS

- A. WCMA A100.1 - Safety of Corded Window Covering Products; Window Covering Manufacturers Association; 2012. (ANSI/WCMA A101.1)

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work with window installation and placement of concealed blocking to support blinds.

1.6 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods.
- C. Certification: Provide certification that product complies with WCMA A100.1.
- D. Shop Drawings: Indicate headrail location.
- E. Selection Samples: For vanes, color chips or material samples representing manufacturer's full range of available colors and patterns.
- F. Verification Samples: For vanes, minimum size 6 inches (150 mm) square, representing actual materials, color and perforations.
- G. Project Record Documents: Record actual locations of pull chains and direction of travel.
- H. Operation and Maintenance Data: Manufacturer's data on repair and replacement of vanes, chains, and other parts.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 016000 - Product Requirements, for additional provisions.
2. Extra Vanes: 20 of each type and size.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section, with not less than two years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of this type with minimum two years of documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. If blinds are delivered early and stored at the project, deliver in unopened containers; handle and store in such a manner to protect them from damage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Manufacturers - Vertical Louver Blinds:
 1. Levolor Contract: www.levolorcontract.com.
 2. The same manufacturer as for horizontal blinds, to obtain match.
 3. Other Acceptable Manufacturers - Vertical Louver Blinds:
 - a. Hunter Douglas: www.hunterdouglas.com.
 - b. Graber, Division of Springs Window Fashions: www.graberblinds.com.
 - c. Prior approved equal.

2.2 BLINDS AND BLIND COMPONENTS

- A. Vertical Louver Blinds: Horizontal travel, vertical louver units complete with tracks, pivot and traversing mechanisms, and accessories, as follows:
 1. Louvers: Aluminum louver blades of the size indicated.
 2. Operation: Manual.
 3. Direction of Travel: Bi-parting.
 4. Mounting: Inside (between jambs).
 5. Cord and Chain Operation: Comply with WCMA A100.1.
- B. Tracks: Channel tracks as required for type of operation, extruded aluminum with baked enamel finish, with end caps.
 1. Dimensions: Approximately 1-3/4 inches (44 mm) by 1-5/16 inches (32 mm) by 0.045 inch (1.1 mm) wall thickness.
 2. Louver Rotation: Chain driven direct rotation by activating tilt gear within end cap assembly in turn actuating tilt rod and worm-and-spur gears in carrier trucks.
 3. Operating Components: Internally mounted heavy-duty extruded aluminum tilt rod, louver carriers, and other components required for proper performance and designed for smooth, quiet, trouble free operation.
 4. Pivot Mechanism: Geared for synchronous 180 degrees rotation of louver blades and type of operation indicated.
 5. Louver Carriers: Metal carriers with ball-bearing wheels or thermoplastic trucks, equipped with linkages or other devices to ensure positive spacing of louver blades.
 6. Tilt Chain: Nickel plated brass beaded ball chain, minimum 1/8 inch (3 mm) diameter; locate at drawback side of units as indicated.
- C. Aluminum Vanes: Flat, 2 inches (50mm) wide.
 1. Thickness: 0.008 inch (0.2 mm), minimum.
 2. Pattern, Color, and Texture: As selected by Architect from manufacturer's full range of colors.
 3. Light and Privacy: Provide perforations or other design features to achieve light and privacy equivalent to Level Two (2) as defined herein.

- a. Acceptance of light and privacy characteristics are subject to Architect's final approval of mock-up.
 - D. Brackets and Mounting Hardware: As recommended by manufacturer for the mounting configuration and span indicated; provide manufacturer's standard L- bracket with clip for outside mounting and clip only for inside mounting.
 - E. Valances: To match louver design and color.
 - 1. Style: As selected by Architect from blind manufacturer's full selection.
- 2.3 FABRICATION
- A. Field measure finished openings prior to ordering or fabrication.
 - B. Fabricate blinds to fit openings within specified tolerances.
 - 1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch (13 mm) space between bottom of vanes and finish floor.
 - 2. Horizontal Dimensions - Outside Mounting: Extend blinds on the collection side to allow full visual access to the window jamb and 6 inches (150 mm) beyond jamb on the other side.
 - C. Dimensional Tolerances: Fabricate blinds to within plus/minus 1/8 inch (3 mm) of intended dimensions.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not start installation before openings are finished and all finishes have been completed; do not install until painting is completed.
- B. Examine finished openings for deficiencies that may preclude satisfactory installation.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- D. Start of installation shall be considered acceptance of substrates.
- E. Field measure finished openings prior to ordering or fabrication.

3.2 PREPARATION

- A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions using mounting style as indicated.
- B. Installation Tolerances:
 - 1. Maximum Offset From Level: 1/16 inch (1.5 mm).
- C. Adjust blinds for smooth operation.
- D. After installation, replace plastic bag around in-place units for protection.
- E. Replace blinds that exceed specified dimensional tolerances at no extra cost to Owner.

3.4 CLEANING

- A. Clean installed work to like-new condition.

3.5 PROTECTION

- A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

September 25, 2015

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Fire Station No. 22
Vertical Louver Blinds

SECTION 12 36 00

COUNTERTOPS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Countertops for architectural cabinet work.
- B. Wall-hung counters and vanity tops.

1.2 RELATED REQUIREMENTS

- A. Division 22 - Plumbing: Sinks

1.3 REFERENCE STANDARDS

- A. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2009.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- C. AWI (QCP) - Quality Certification Program, www.awiqcp.org; current edition at www.awiqcp.org.
- D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- E. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; International Surface Fabricators Association; 2013.
- F. WI (CCP) - Certified Compliance Program (CCP); current edition at www.woodworkinstitute.com/certification.
- G. WI (MCP) - Monitored Compliance Program (MCP); current edition at www.woodworkinstitute.com/certification.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.
- D. Verification Samples: For each finish product specified, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.
- E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- F. Installation Instructions: Manufacturer's installation instructions and recommendations.
- G. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.5 SUSTAINABILITY SUBMITTALS

- A. LEED Submittals: Provide special submittals conforming to Section 018113 – Sustainable Design Requirements for the following:

1. Product Data for Credit MR 4.1 and MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
 2. Product Certificates for Credit MR 5.1 and MR 5.2: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
 - a. Include statement indicating distance from manufacturer to Project for each regionally manufactured material.
 - b. Include statement indicating location of and distance from Project to point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials.
 3. Certificates for Credit MR 7: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification and chain-of-custody requirements. Include statement indicating cost for each certified wood product.
 4. LEED Credit EQ 4.1: Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.
 5. Laboratory Test Reports for Credit EQ 4.1: For adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 6. Credit EQ 4.3: Product data for flooring materials used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.
 7. LEED Credit EQ 4.4: Product data for products containing composite wood or agrifiber products or wood glues indicating that they do not contain urea-formaldehyde resin.
- B. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
- 1.6 QUALITY ASSURANCE
- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a licensee of WI's Certified Compliance Program.
 - B. Fabricator Qualifications: Same fabricator as for cabinets on which tops are to be installed.
 - C. Quality Certification: Provide WI Certified Compliance Program (CCP) inspection report and quality certification of completed work.
 1. Provide labels or certificates indicating that the work complies with requirements of AWI/AWMAC/WI (AWS) grade or grades specified.
 2. Prior to delivery to the site provide shop drawings with certification labels.
 3. Provide labels on each product when required by certification program.
 4. Arrange and pay for inspections required for certification.
 5. Replace, repair, or rework all work for which certification is refused.
 - D. Installer Qualifications: Fabricator of products and Licensee of WI's Certified Compliance Program.
 - E. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Retain first subparagraph below and indicate on Drawings plastic-laminate cabinets represented by mockup or draw mockup as separate element; otherwise insert a description of the cabinets to be mocked up.
 2. Build mockups of typical countertops as indicated on Drawings.
 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- F. Fabrication and Installation Standards: Fabricate and install in accordance with Architectural Woodwork Standards, Edition 1 as listed below.
1. Countertops: AWS Section 11.
 2. Installation: AWS Appendix B - 12.
- G. Woodwork Institute (WI) Certification:
1. Millwork, casework and cabinetwork shall be manufactured in accordance with standards established in the Architectural Woodwork Standards, Latest Edition, published jointly by the Woodwork Institute, Architectural Woodwork Institute, and the Architectural Woodwork Manufacturer's Association of Canada, in grade or grades herein specified or as shown on Drawings.
 2. Before delivery to jobsite, woodwork supplier shall submit Woodwork Institute Certified Compliance Certificate indicating millwork products being supplied and certifying that products fully meet the requirements of Grade or Grades specified.
 3. At completion of installation, woodwork installer shall provide Woodwork Institute Certified Compliance Certificate indicating the products installed, and Certifying that the installation of these products fully meets the requirements of the Grade or Grades specified.
 4. All fees charged by the Woodwork Institute for their Certified Compliance program are responsibility of millwork manufacturer and/or installer and shall be included in their bid.
 5. The foregoing shall not be construed to limit power and authority of Owner to reject any millwork which does not in Owner's opinion meet with any one or more of the specifications of this Contract.
- 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 FIELD 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.

PART 2 PRODUCTS

2.1 COUNTERTOP ASSEMBLIES

- A. General: Refer to Finish Schedule for selected products.
- B. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI (AWS).
- C. Plastic Laminate Countertops: High pressure decorative laminate sheet bonded to substrate.
 1. Laminate Sheet, Unless Otherwise Indicated: NEMA LD 3, Grade HGS, 0.048 inch (HGS, 1.2 mm) nominal thickness.
 - a. Surface Burning Characteristics: Flame spread 25, maximum; smoke developed 450, maximum; when tested in accordance with ASTM E84.
 - b. NSF approved for food contact.
 - c. Wear Resistance: In addition to specified grade, comply with NEMA LD 3 High Wear Grade requirements for wear resistance.
 - d. Finish: Matte or suede, gloss rating of 5 to 20.

- e. Surface Color and Pattern: As selected by Architect from the manufacturer's full line.
 - f. Manufacturers:
 - 1) Formica Corporation: www.formica.com.
 - 2) Lamin-Art, Inc.: www.laminart.com.
 - 3) Panolam Industries International, Inc./Nevamar: www.nevamar.com.
 - 4) Wilsonart, LLC: www.wilsonart.com.
 - 2. Edge Treatment: As indicated.
 - 3. Back and End Splashes: Same material, same construction.
- D. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
- 1. Flat Sheet Thickness: 1/2 inch (12 mm), minimum.
 - 2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMALD 3; acrylic resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
 - a. Surface Burning Characteristics: Flame spread 25, maximum; smoke developed 450, maximum; when tested in accordance with ASTM E84.
 - b. Physical Properties:
 - 1) Tensile Strength: 3900 psi, ASTM D638.
 - 2) Tensile Modulus: 5 x 10⁵ psi, ASTM D638.
 - 3) Hardness 90 Rockwell "M" scale or 56 Barcol Impressor, minimum.
 - 4) Water Absorption: 3/4 inch material 24 hours, 0.08 percent by weight, ASTM D570.
 - 5) Izod Impact: 0.242 lbf ft/in. of notch, Method A, ASTM D256.
 - 6) Impact Resistance: No fracture, NEMA LD3
 - (a) 1/4 inch slab, 36 inch drop, 1/2 pound ball
 - (b) 1/2 inch slab, 36 inch drop, 1 pound ball
 - c. Basis of Design Manufacturers:
 - 1) Dupont: www.corian.com.
 - 2) Other Acceptable Manufacturers:
 - (a) Avonite Surfaces: www.avonitesurfaces.com.
 - (b) Formica Corporation: www.formica.com.
 - (c) Wilsonart, LLC: www.wilsonart.com.
- E. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with the "Physical Characteristics of Materials" Article of ANSI SS1.
- 1. Material certified by NSF International for food and water contact.
 - 2. GreenGuard certified as low-emitting material.
 - 3. Identification: Label material with batch number and imprint on back with manufacturer's identifying mark.
 - 4. Physical Properties:
 - a. Flexural Strength: 7,400 psi min, ASTM C880.
 - b. Absorption: Less than 0.02 percent, ASTM C97
 - c. Mohs Hardness: 6.5-7.5; scratch test.
 - d. Stain and Acid Resistance: Not affected; ASTM D2299.
 - e. Wear Resistance: 36.12 gram average; ASTM C501, tested with 1 kg. load, 1000 cycles at 70 rpm.
 - f. Surface Burning: Flame Spread 10; Smoke Density 195; ASTM E84.
 - g. Thermal Shock Resistance: Passes 5 cycles, 75 - 295 degrees F; ASTM C484.
 - 5. Basis of Design Products SS-01: Subject to compliance with requirements, provide the following:
 - a. Cosentino USA; Echo: www.ecobycosentino.com.
 - 6. Colors and Patterns: As indicated on the Drawings.
 - 7. Configuration: Provide countertops with the following front and backsplash style:
 - a. Front: Straight, slightly eased at top.
 - b. Backsplash: Straight, slightly eased at corner.

- c. Endsplash: As indicated on the Drawings.
- 8. Countertops: 2 cm thick, quartz agglomerate with front edge built up with same material.

2.2 ACCESSORY MATERIALS

- A. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2.
- B. Seam Adhesive: Type recommended by manufacturer; color to blend with sheet material.
 - 1. Adhesives shall meet or exceed the VOC and chemical component limits of Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit requirements.
- C. Solid Surface Seam Adhesive:
- D. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
 - 1. Non-staining
 - 2. Will not induce mildew and fungus growth
 - 3. Adhesives shall meet VOC and chemical component limits of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 and Cal GREEN Table 5.504.4.1 Adhesive VOC Limit requirements.
- E. Impregnator/Sealer:
 - 1. 96 - 100 percent breathable silicone material formulated for protection of natural stone.
 - 2. Penetrates, impregnates, and chemically bonds to stone pores to harden surface without change to natural stone appearance.
 - 3. UV resistant and non-yellowing.
 - 4. Material and primer as recommended by impregnator manufacturer and by stone producer for application indicated.
 - 5. Paint Maximum Product Emissions Limits: Top coat and primer interior paints must meet current requirements for VOC (Volatile Organic Compounds) limits of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.
 - a. Cal-GREEN Requirements for typical paint coatings:
 - 1) Primers, Sealers, and Undercoaters: 100 grams per liter of product minus water.
- F. Joint Sealant: As specified in Section 079200 - Joint Sealants.

2.3 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
 - 1. Join lengths of tops using best method recommended by manufacturer.
 - 2. Fabricate to overhang fronts and ends of cabinets as indicated on Drawings.
 - 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B. Fabricate items to profiles shown with connections and supports as detailed or as required for proper installation per manufacturer's recommendations.
- C. Provide cut-outs for plumbing fixtures and trim, washroom accessories, appliances, and related items. Confirm lay-out with manufacturer's cut-outs templates before beginning work. Round corners of cut-outs and sand edges smooth.
- D. Do not exceed manufacturer's recommended unsupported overhang distances.
- E. Provide back splash wherever counter edge abuts vertical surface unless otherwise indicated.
 - 1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
 - 2. Height and Location: As indicated on Drawings.
- F. Solid Surfacing: Fabricate tops up to 144 inches (3657 mm) long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.

- G. Stone: Comply with MIA recommendations for stone lavatories and countertops.

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.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

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. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 - 1. Install backsplashes to comply with manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
 - 2. Seal edges of cutouts in particleboard subtops by saturating with varnish.
- C. Seal joint between back/end splashes and vertical surfaces.

3.4 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet (3 mm in 3 m), maximum.
- B. Offset From Wall, Countertops: 1/8 inch (3 mm) maximum; 1/16 inch (1.5 mm) minimum.
- C. Field Joints: 1/8 inch (3 mm) wide, maximum.

3.5 CLEANING

- A. Clean countertops surfaces thoroughly.

3.6 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 12 48 23
ENTRANCE FOOT GRIDS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Entrance foot grids at entryways.

1.2 SUBMITTALS

- A. Shop Drawings: Submit drawings which include dimensions, details, anchorage finishes and accessories.
- B. Product Data: Submit manufacturer's specifications and color chart.
- C. Samples:
1. Submit manufacturer's sample (12-inch x 12-inch) showing required texture and color.
 2. Submit 12 inch length of frame member.
- D. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Storage and Protection: Upon delivery to the job, store mats in a dry, ventilated space, and protect from damage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. As manufactured by Construction Specialties, Inc. (760) 734-4000 or equal.

2.2 MATERIALS

- A. Frames: Extruded aluminum alloy (per manufacturer). Areas of frame to come in contact with cementitious material shall be coated with zinc chromate paint or manufacturer's standard protective coating.
- B. Foot Grid (recessed into concrete): C/S Model #635A-B-LB or equal, serrated extruded 6105-T5 alloy aluminum. Color to be black. Provide custom size as shown no drawings and as directed by Architect and Resident Engineer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine the areas and conditions under which the work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Install floor mats at locations indicated in strict accordance with manufacturer's printed instructions and approved shop drawings.
 - 1. Align work plumb, level, and flush with adjacent surfaces.
 - 2. Install in direction as indicated on Drawings.

3.3 CLEANING

- A. Upon completion of this portion of the work, promptly clean exposed portions and remove traces of dirt, grease and foreign materials.
- B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

SECTION 12 93 13

BICYCLE RACKS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Bicycle racks.

1.2 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Mounting surface for bicycle racks.

1.3 REFERENCE STANDARDS

- A. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Indicate size, shape, and dimensions, including clearances from adjacent walls, doors, and obstructions.
- D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Handle racks with sufficient care to prevent scratches and other damage to the finish.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Manufacturer Outdoor Bicycle Racks:
 - 1. Function First Bike Security; The Bike Rib 1.5: www.bikerack.com.
 - 2. Other Acceptable Manufacturers:
 - a. Columbia Cascade Company: www.timberform.com.
 - b. Creative Pipe, Inc: www.creativepipe.com.
 - c. Highland Products Group, LLC: www.indoorbikeracks.net.
 - d. Huntco Supply, LLC: www.huntco.com.
 - e. Landscape Forms, Inc.; Bola Bicycle Rack : www.landscapeforms.com.
 - f. Prior approved equal.

2.2 EXTERIOR BICYCLE RACKS

- A. Exterior Bicycle Racks: Device allows user provided lock to simultaneously secure one wheel and part of the frame on each bicycle parked or racked.
 - 1. Style: Inverted horseshoe rack formed by one u-shaped bend of round pipe.
 - 2. Capacity: 2 bicycles.

3. Size: 18-1/4 by 34 inches.
4. Mounting, Ground: Surface flange.
5. Galvanized.
6. Finish: Powder coat, maintenance-free and weather-resistant.
7. Color: As selected by Architect from manufacturer's complete range.
8. Accessories: Surface flange cover.

2.3 MATERIALS:

- A. Recycled Content of Stainless Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.
- B. Tube: Carbon steel, ASTM A500/A 500M.
 1. 1-1/2 inch diameter by 0.120 thick wall.

2.4 ANCHORS

- A. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
 2. First option in "Material for Exterior Locations and Where Stainless Steel Is Indicated" Subparagraph below refers to Type 304 and similar alloys; second option refers to Type 316 and similar alloys.
 3. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.5 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. Steel and Iron Components: Galvanized, galvanized and color coated, or color coated. Bare metal steel or iron components are not permitted.
- E. Exposed Surfaces: Polished, sanded, or otherwise finished; smooth all surfaces, free from burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.
- F. Factory Assembly: Assemble components in the factory to the greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for 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.

2.7 STEEL AND IRON FINISHES

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Do not prime surfaces in direct contact with concrete or where field welding is required.
- C. Galvanizing: Hot-dip galvanize to minimum requirements of ASTM A123/A123M.
 - 1. Touch up abraded areas after fabrication using specified touch-up primer for galvanized surfaces.
 - 2. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
 - a. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
 - b. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.
- D. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- E. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
- F. Preparing Galvanized Parts for Shop Priming: After galvanizing, thoroughly clean parts of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.
- G. Powder Coating: Immediately after cleaning, apply two-coat finish consisting of epoxy primer and TGIC polyester topcoat, with a minimum total dry film thickness of not less than 8 mils (0.20 mm). Comply with coating manufacturer's written instructions.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive bicycle racks.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Do not begin installation until unsatisfactory substrates have been properly repaired.

3.2 PREPARATION

- A. Ensure surfaces to receive bicycle racks are clean, flat, and level.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install bicycle racks level, plumb, square, and correctly located as indicated on the drawings.
- C. Surface Flange Installation: Anchor bicycle racks securely in place with 1/2 inch (13 mm) by 4 inch (101 mm) anchor bolts through flange holes.

3.4 CLEANING

- A. Clean installed work to like-new condition. Do not use cleaning materials or methods that could damage finish.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 21 01 50

FIRE PROTECTION (SPRINKLER SYSTEM) COORDINATION

PART 1 GENERAL

1.1 QUALITY ASSURANCE

- A. The fire sprinkler system designer/subcontractor shall ensure that all exposed piping, valves, connections, drains and apparatus of any kind shall be fully reviewed and coordinated with the Architect and Resident Engineer. Exposed sprinkler heads shall typically be placed in the center of the ceiling tile or pattern. The shop drawings shall explicitly cloud all exposed conditions and shall be reviewed, authorized and initialed by the Architect and Resident Engineer prior to installation. The purpose of this review is to insure that all components of this system are placed in as discrete and as minimally impacting a location as possible. Failure by the fire sprinkler system designer/subcontractor to point out and secure Architect and Resident Engineer review and written approval of all exposed conditions shall result in relocation of any exposed items as directed by the Architect and Resident Engineer at no additional cost to the owner. The Contractor shall also provide the owner with one safety device head capping device for each different type of sprinkler head utilized in the project.
- B. Contractor shall ensure that hangers, supports, pipes, braces to be hung true and vertical (neat and clean) where exposed to view in conditioned spaces and other customer zones as directed by Architect and Resident Engineer.

1.2 SUBMITTALS

- A. See additional Fire notes on the drawings and required design drawings for Fire Protection system (Sprinkler) from selected subcontractor for fire dept. review and approval prior to installation.

1.3 PROJECT/SIDE CONDITIONS

- A. Contractor shall field verify existing ceiling heights in strategic rooms where ceiling is going to be raised and/or replaced. Contractor shall include modification of of heads and small supply lines to these heads as part of their bid. Note: major lateral lines are to remain unless otherwise noted in drawings.

END OF SECTION

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SECTION 22 00 00

PLUMBING

PART 1 -GENERAL

2.1 SUMMARY

- A. The work under this section includes the furnishing of all labor, material and equipment and performing all operations in connection with plumbing work, as indicated on the drawings, specified herein, or reasonably implied to complete the work. This includes but is not necessarily limited to:
1. Sanitary sewer and vent system
 2. Rainwater drain system
 3. Condensate drain system
 4. Domestic water system
 5. Fuel gas system
 6. Compressed air system
- B. The word "piping" in this section includes pipe, fittings, nipples, valves, and any accessory pertinent to mains and connections throughout the system.

2.2 RELATED DOCUMENTS

- A. The applicable requirements from the following sections shall form a part of this section.
- | | |
|-----------------|-------------------------------|
| Section 23 0300 | Basic Mechanical Requirements |
|-----------------|-------------------------------|

PART 2 -PRODUCTS

2.1 GENERAL

- A. All materials, fixtures, and equipment shall be new and of the type and grade specified. All materials used for the same general use shall be of the same type, grade and manufacturer.
- B. Unless otherwise specified, all exposed AP® traps shall be adjustable, 17 gauge, chrome plated brass.
- C. Unless otherwise specified, all exposed angle stops, nipples, and escutcheons shall be chrome plated brass.
- D. Accessible plumbing fixtures shall comply with all of the requirements of CBC section 1115B.
- E. Heights and location of all fixtures shall be in accordance with CBC table 1115B-1.
- F. Fixture controls shall comply with CBC section 1118B.

2.2 FIXTURES

- A. Protection: Cover and protect all fixtures until completion.
- B. Exposed Metal: Unless otherwise specified, all exposed metal at fixtures shall be polished chrome plated.

- C. Suppliers: Unless otherwise specified, individual fixtures shall all be from the same manufacturer, not intermixed.
- D. Manufacturer and Model Numbers: See drawings for manufacturer and model number of fixture to be furnished and installed complete by this Contractor.

2.3 EQUIPMENT

- A. Protection: All equipment shall be protected against damage during storage and installation.
- B. Water pressure Reducing Valve: Pressure reducing valve shall be capable of reducing water pressure from 100 PSI to 50 PSI, and shall be approved by the San Diego Water Utilities Dept. PRV valve shall be Watts 223, or equal.
- C. Gas Pressure Regulator: Gas pressure regulator shall be pilot-operated with the low pressure pilot integrally mounted to the actuator. The pressure regulator shall have a steel body with screwed ends, a nylon disk, and sized to meet the pressure and flow requirements specified on the drawing. Pressure regulator shall be Fisher type 99, or equal.
- D. Trap Primer, TP-1: Trap primer shall be automatic, with bronze body, integral vacuum breaker, and shall have a distribution unit when serving more than one drain. Trap primer shall be J.R. Smith 2699, Zurn Z-1022, Precision Products model P-1, or equal.
- E. Circulating Pump, CP-1: Circulating pump shall be designed for domestic water service with 3/4 inch flanged ends, 1/12 hp.
- F. Expansion Tank: Expansion tank shall be approved for potable water, and shall be Amtrol Inc. ST-30V, or equal.

2.4 PIPING

- A. Sanitary Sewer and Vent Piping
 1. All soil, waste, and vent piping material and fittings within building and within 5 feet of building boundary shall be cast iron, hubless, per CISPI 301 & IAPMO IS 6, using stainless steel clamps and shield assemblies per CISPI 310.
 2. Cleanouts for Finished Floors: All soil and waste piping cleanouts in finished floor areas shall be cast iron with a round, adjustable, non-skid nickel bronze top, and tapered bronze threaded plug with raised square head or approved counter-sunk rectangular slot. Cleanouts shall be J.R. Smith 4023, or equal.
 3. Cleanouts for Finished Floors: All soil and waste piping cleanouts in finished floor areas shall be cast iron with a square, adjustable, non-skid nickel bronze top, and tapered bronze threaded plug with raised square head or approved counter-sunk rectangular slot. Cleanouts shall be J.R. Smith 4043, or equal.
 4. Cleanouts for Unfinished Floors: All soil and waste piping cleanouts in unfinished floor areas shall be cast iron with a round, adjustable top, and tapered bronze threaded plug with raised square head or approved counter-sunk rectangular slot. Cleanouts shall be J.R. Smith 4223, or equal.
 5. Cleanouts for Outside: All sewer/drain piping cleanouts outside of building shall be cast iron with ribbed ferrule and tapered bronze threaded plug with raised square head or approved counter-sunk rectangular slot. Cleanouts shall be protected with a

pre-cast concrete box with an iron lid, marked "SEWER". Cleanouts shall be J.R. Smith 4283-RHP, or equal. Box shall be San Diego Pre-cast Concrete, Brooks 3-T, or equal.

6. Test Tees and Wall Cleanouts: All test tees and wall cleanouts shall be of an approved type. Plugs shall be tapered, threaded bronze and shall have a raised square head or approved counter-sunk rectangular slot.

B. Rainwater Piping

1. All rainwater piping within building and within 5 feet of building boundary shall be cast Iron, hubless, per CISPI 301 & IAPMO IS 6, using stainless steel clamps and shield assemblies per CISPI 310.

C. Condensate Drain Piping

1. All air conditioning condensate drain piping material and fittings shall be copper, hard drawn, type M per ASTM B 88 and IAPMO IS 3 with cast solder-joint fittings per ANSI B 16.23, or wrought solder-joint fittings per ANSI B 16.29. Solder shall be ASTM B 32, 95-5 tin-antimony or grade Sn96 tin-solder.

D. Domestic Hot and Cold Water Piping

1. All hot and cold water piping within building and within 5 feet of building boundary shall be copper, hard drawn, type "L" conforming to ASTM B 88 with cast solder joint fittings per ANSI B 16.18, or wrought solder joint fittings per ANSI B 16.22. Fittings shall be brazed with a silver base brazing alloy or soldered with a lead-free solder and using a non-corrosive type flux.
2. All water piping outside building, below grade, shall be copper, type AK®, conforming to ASTM B 88, with cast solder joint fittings per ANSI B 16.18, wrought solder joint fittings per ANSI B 16.22, or ANSI B 16.26 flared joint fittings. Solder joint fittings shall be brazed with a silver base brazing alloy or soldered with a lead-free solder and using a non-corrosive type flux.
3. Shut off valves 2-inch and smaller shall be 3 piece, full port, bronze ball type, bronze trim, teflon seals, 600 psig WOG, with threaded or solder end joints as required. Valves shall be Nibco S-595 series, Apollo 82 series, or equal.
4. Shut off valves 2-1/4 inches and larger shall be butterfly type, full lug, with ductile or cast iron body, dry stainless steel stem, bronze disc, EPDM elastomeric seat, not less than 10-position throttling handle or infinite stops with memory stop, and 150 psig WOG. Valves shall be Nibco LD-2000, Keystone 129, or equal.
5. Globe valves 2-inches and smaller shall have a bronze body with rising stem, teflon disc, renewable seat and disc, screw-in bonnet, 200 psi WOG, and threaded or solder end joints as required. Valves shall be Nibco T-211-Y or S-211-Y, Stockham B-13-T or B-14-T, or equal.
6. Check valves 2-inches and smaller shall have a bronze "Y" pattern body swing check valve, bronze disc, screwed cap, 200 psi WOG, with threaded or solder end joints as required. Valves shall be Nibco T-413-B or S-413-B, Stockham B-309, or equal.
7. Unions 3-inches and smaller shall be all bronze with ground joint and 400 pound WWP.

8. Nipples shall be red brass.

E. Fuel Gas Piping

1. Gas piping above grade shall be black steel, schedule 40 per ASTM A 53 or ASTM A 120 with malleable iron screw joint fittings conforming to ANSI B16.3 and/or black steel welding fittings conforming to ANSI B16.9.
2. Gas piping below grade shall be polyethylene per ASTM D 2513 and IAPMO IS 12 with heat fusion fittings per ASTM D 2513 and ASTM D 3261. Piping shall be marked per IAPMO IS 12-93 and shall indicate the manufacturers name, nominal pipe size, designation code, "SDR" number, and the words "GAS PIPING" over the complete length of pipe.
3. Gas Cocks 2-inch and smaller shall be all bronze, flat head for gas service, Crane No. 270, Walworth No. 590, or equal. Gas cocks 22-inches and larger shall be for 175 lb. WWP, lubricated square head, ACF No. R-1430, Nordstrom No. 142, or equal.

F. Compressed Air Piping

1. Compressed air piping shall be black steel, schedule 40, seamless or electric resistance welded, ASTM A 53. Fittings shall be threaded malleable iron per ANSI B 16.3 Class 150, or 3000-pound socket welding forged carbon steel or 2000-pound threaded forged carbon steel per ANSI B 16.11.
2. Compressed air shut-off valves 2-inches and smaller shall be class 150, gate type, with bronze body, wedge disc, rising stem, union bonnet, and threaded end connections per MSS SP-80. Valves shall be Nibco T-134, Stockham B-120, or equal.
3. Compressed air outlets shall be a brass tubular valve quick disconnect type, with push type connection, male pipe thread, Buna-N seal, and pawl type locking device. Outlets shall be Schrader Bellows "Safromatic", or equal.

2.5 ACCESSORIES

A. Access Panels

1. Access Panels for Valves and Equipment: Wall and ceiling access panels shall have a minimum of 16 gauge doors, with continuous, concealed, fire-rated hinges. Panels shall be paintable and sized suitable for removal or repair of valves or equipment, but not less than 8 inches by 8 inches for hand holes and 20 inches by 24 inches for scuttle holes. Access panels shall be J.R. Smith 4762 series for tile, masonry or dry wall construction, and J.R. Smith 4767 series for plaster or wet wall construction, or equal.
2. Access Covers for Cleanouts: Access covers for walls shall be, 8 inches by 8 inches. Access panels shall be J.R. Smith 4730 series for tile, masonry, or dry wall construction, and 4735 series for plaster or wet wall construction, or equal.

B. Pipe Sleeves: Pipe sleeves shall be schedule 40 galvanized steel pipe.

C. Dielectric Unions: Dielectric unions shall be Epco, V-Line, or equal.

D. Sealant: Sealant shall be silicone rubber, except at fire rated penetrations, sealant shall be

Dow Corning 785/5, General Electric SCS 1702, or equal.

E. Insulation

1. General: All insulation and covers shall have a UL flame spread not higher than 25 and a smoke developed rating not higher than 50.
2. Air Conditioning Condensate Piping: All copper condensate piping located inside of building shall be insulated with 2 inch thick flexible cellular foamed plastic insulation having not more than a 0.28 K factor at 75 degrees f mean. Insulation shall be Thermo-Cel, Armstrong, or equal.
3. Hot Water Piping: All hot water piping and fittings above ground shall be insulated with preformed fiberglass pipe insulation with "ASJ" jacket. Thickness shall be per Table 1-G of the 1992 California Energy Commission Energy Efficiency Standard. Pipe insulation shall be Schuller "Micro-Lok", or equal. Fitting covers shall be Schuller "Zeston 2000 pvc" with insert, or equal. Joints shall be sealed per manufactures instructions.
4. Exposed Waste Pipe: All exposed waste piping under lavatories, accessible to physically handicapped shall be insulated with prefabricated trap insulation. Insulation shall be Truebro Inc "Handi Lav-Guard ", or equal.

PART 3 - EXECUTION

3.1 GENERAL

- A. All work shall be performed by skilled mechanics, under the supervision of a competent foreman and in accordance with the highest standards of practice of the trade.
- B. All openings in pipes, fittings, fixtures, or equipment shall be capped at the end of each work day. All materials, fixtures, and equipment shall have ample protection to prevent damage during construction.
- C. Access panels shall be provided for all valves, cleanouts, and other equipment which is concealed in floors, walls, or ceilings.
- D. The contractor shall be responsible for all damage to any part of the premises or its contents caused by leaks, breaks in piping, fixtures, or equipment furnished and/or installed by contractor for a period of one year from the date of acceptance of the work by the owner or his representative.
- E. Fixtures or equipment with damaged finish shall be removed and replaced with new fixtures/equipment at the contractor's expense.

3.2 FIXTURE/EQUIPMENT INSTALLATION

- A. Fixture Setting: All fixtures shall be anchored and set level and square in relation to wall and floor lines, and shall be installed with equal spacing where applicable. Voids between fixtures and walls/floors shall be filled with Dow Corning No. 780, white mastic cement. The contractor shall be responsible for correct fixture locations.
- B. Equipment Setting: All equipment shall be braced or anchored to resist a horizontal force in any direction using the following criteria: a) 30% of operating weight for fixed equipment on grade, b) 45% of operating weight for fixed equipment on structure.

- C. Drain Strainers: All drain strainers, unless otherwise specified, shall be set parallel to adjacent wall.
- D. Electrical Work: See Electrical Section for all electrical work associated with the installation of equipment.

3.3 PIPING INSTALLATION

- A. Workmanship: All piping, except as shown otherwise on drawings, shall be run concealed in furred walls, partitions, furred ceilings, etc. Prior to installation each piece of pipe and each fitting shall be inspected inside and outside to assure that there are no defects or obstructions. Threaded joints shall be assembled with an approved pipe joint compound applied to male thread only with not more than two threads left exposed.
- B. Excavation: The Contractor shall be prompt in installing all piping after excavation or cutting for same, so as to keep all excavations for this work open as short a time as possible. No piping, however, shall be permanently closed up, furred in or covered before inspection and approval of same by the Owner's representative.
- C. Bushings: No bushings or close nipples shall be used. Reducing fittings and shoulder nipples shall be used in all cases.
- D. Pipe Preparations: Copper tubing/pipe shall be cut square and ends shall be reamed to full size with all burrs removed. Tubing pipe ends and fitting sockets shall be burnished with emery cloth or wire brush before a uniform coat of non-corrosive type flux is applied.
- E. Pipe Runs: Pipe runs shall be made with full pipe lengths using a minimum of joints. All piping shall be accurately cut to length. No piping shall be forced or sprung into place. All off-sets shall be made with fittings. Bending of pipe is not allowed.
- F. Pipe Support: Piping shall be supported at each change of direction, at ends of branches, at base and at top of all risers, and wherever necessary to prevent sags, bending, or vibration of the piping. Pipe hangers and supports shall be selected as specified in Manufacturers Standardization Society of Valve and Fittings Industry (MSS) standard SP-69.
- G. Pipe Isolation: All piping shall be isolated from the building with 1/4 inch hair felt between pipe hangers/supports, pipe insulators, and suspension clamps.
- H. Pipe Sleeves: All piping passing through concrete/masonry floors and walls, or fire rated partitions shall be provided with standard weight steel pipe sleeves as follows:
 - 1. All sleeves through floors above grade shall extend 1 inch above floor line.
 - 2. All sleeves shall have 1 inch minimum clearance between the sleeve I.D. and the pipe or pipe insulation.
 - 3. Clearance between sleeve and piping in fire rated walls, floors, or partitions shall be sealed with Underwriters Laboratories listed and Factory Mutual approved sealant. Thickness shall be as recommended by the manufacturer for the designated fire rating. Sealant shall be 3M Brand Fire Barrier Sealing System, Dow Silicone RTV foam, or equal.
 - 4. Clearance between sleeve and piping in non-fire rated walls, floors, or partitions shall be sealed with oakum, or equal.

- I. Connections: All pipe connections to fixture/equipment that requires reduction in size shall be reduced just prior to connection.
- J. Escutcheons: All pipes passing through walls, floors, and ceilings in finished areas shall have chrome plated steel/brass escutcheons.
- K. Sanitary Drain and Rainwater Systems
 - 1. Install soil, waste, rainwater, and vent piping to all outlets as shown on drawings. Piping shall be supported and strapped in an approved manner. Sanitary piping in and under the building shall run to a uniform grade. Contractor shall verify the point of connection as shown on drawings regarding invert elevation and location before starting work. Waste lines shall not penetrate shear wall top and bottom plates.
 - 2. Drains: All drains installed not on grade shall incorporate a clamping collar and flashing. Flashing shall extend 8 inches out in all directions.
 - 3. Interior Clean Outs: Interior cleanouts shall be installed where indicated and as required by code. Cleanouts shall be accessible, and where possible, shall be brought to grade and set flush with finished floor. Horizontal drainage piping shall be provided with cleanouts at its upper terminals, at changes in pipe sizes and not over 100 feet apart in any lineal run of piping.
 - 4. Exterior Cleanouts: Exterior cleanouts in concrete or asphalt areas shall set flush with grade or paved area. Cleanouts in earth shall be extended to within 6-inches of finished grade and terminated in a concrete box set level with finished grade. Clean out plugs shall be liberally lubricated with graphite, turned tight and backed off slightly.
- L. Sanitary Vent System
 - 1. Vents shall be connected together in attic spaces or walls where practical to penetrate roof as few times as possible. Vents shall not penetrate top plates or structural beams but shall offset around them. All vents through roof shall be flashed.
 - 2. Vent Termination: All vents and flue outlets shall be a minimum of 10 feet from all fresh air intakes.
 - 3. Air Conditioning Condensate System: Install condensate drain piping from air conditioning units to receptors as shown on the drawings. Piping installed on the roof shall be set on redwood blocks, six-foot on centers, set in mastic.
- M. Domestic Water System
 - 1. Install water piping to all fixtures, hose bibbs, etc., as shown on drawings. All branches to fixtures shall be valved. Single fixtures and lines to hose bibbs shall be valved. Where supplies are concealed, or where indicated, loose-key stops shall be installed. Drop ear fittings with red brass nipples shall be provided at all outlets.
 - 2. Slope: All water piping shall be graded and valved to provide for drainage control of the system.
 - 3. Noise: Water piping shall be installed so as to not cause noise from flow of water under normal conditions.

4. Isolation: Copper lines shall be isolated from all dissimilar metal and equipment with dielectric couplings. Dielectric couplings shall be used for all connections between pipe or tubing and all hot water equipment inlets and outlets.

N. Fuel Gas System

1. Install gas piping from gas meter to all outlets as shown on drawings. Provide a gas cock at each outlet.
2. Piping: Gas Piping, concealed or exposed, shall be installed in a neat appearing manner, parallel or perpendicular to building lines. All gas piping shall have threaded fittings.

3.4 TESTING

- A. General: Operational test shall be conducted on all fixtures, equipment, and devices installed, to determine proper compliance with specifications. All fixtures, equipment, and devices shall function quietly, efficiently, and undue noise or vibration caused by piping, equipment, etc, shall be promptly corrected before acceptance.
- B. Sanitary Drain and Rainwater System: All sanitary drain, vent and rainwater piping shall be hydrostatically tested to a minimum of a 10 foot head above the head at the highest inlet. Pressure shall be maintained for a minimum of (1) hour. The system shall have no leaks.
- C. Domestic Water System: Prior to disinfection and installation of pipe insulation, all domestic water piping shall be hydrostatically tested at 125 psig at the highest outlet for minimum of four (4) hours. Any equipment or fixtures that may be damaged by the test should be disconnected. No perceptible gauge loss shall be allowed except for temperature change.
- D. Natural Gas System: All natural gas piping shall be tested with compressed air at 60 psig minimum with no perceptible drop in pressure. Test shall be made with a recording gauge. Test shall be for at least 24 hours. Charts shall include date and time test was started, identification of journeyman responsible for the test, and the signature of the inspector.

3.5 CLEANING

A. Disinfection of Portable Water System

1. General: New or repaired potable water systems shall be disinfected prior to use whenever required by the Administrative Authority. The method to be followed shall be that prescribed by the health authority or, in case no method is prescribed by them, the following:
2. The pipe system shall be flushed with clean, potable water until only potable water appears at the point of outlet.
3. The system or parts thereof shall be filled with a water-chlorine solution containing at least fifty (50) parts per million of chlorine and the system or part thereof shall be valved-off and allowed to stand for twenty-four (24) hours, or, the system or part thereof shall be at least two hundred (200) parts per million of chlorine and allowed to stand for three (3) hours.
4. Following the allowed standing time, the system shall be flushed with clean, potable water until the chlorine residual in the water coming from the system does not exceed the chlorine residual in the flushing water.

5. The procedure shall be repeated if it is shown by bacteriological examination made by an approved agency that contamination persists in the system.

END OF SECTION

SECTION 23 00 00

HVAC EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

- A. The work under this section includes the furnishing of all labor material, and equipment, and performing all operations in connection with heating, ventilating and air conditioning work, as shown and specified.
- B. The work includes but is not necessarily limited to:
 - 1. Exhaust Fans
 - 2. Ductwork & Accessories
 - 3. Air Distribution
 - 4. Refrigerant Pipe & Accessories
 - 5. Thermal Insulation

1.2 REFERENCE TO OTHER SECTIONS

- A. The applicable requirements from the following Sections shall form a part of the heating, ventilating and air conditioning (HVAC) work and the Contractor shall consult them in detail for general and specific requirements.

Section 22 0000	Plumbing
Section 23 0300	Basic Mechanical Requirements
Section 23 0593	Testing, Adjusting & Balancing for HVAC Systems
Section 23 0923	Direct Digital Control System
Section 23 3500	Overhead Vehicle Exhaust Removal Systems

PART 2 PRODUCTS

2.1 GENERAL

- A. All material and equipment used in the installation shall be new and in perfect condition when installed. Material, equipment and components shall be the standard catalog product of reputable manufacturers regularly engaged in the manufacturing of such equipment. All articles provided for the same general purpose or use shall be of the same make. Submittal of any equipment for approval shall specifically indicate any item that does not meet the specification. If approval is given when such items have not been listed, removal of the equipment may be required.

2.2 OUTDOOR UNIT

- A. General:
 - 1. The outdoor unit shall be factory assembled and pre-wired with all necessary electronic and refrigerant controls. The refrigeration circuit of the condensing unit shall consist of a compressor, motors, fans, condenser coil, electronic expansion valve, solenoid valves, capillaries, filters, shut off valves, oil separators, service ports, liquid receivers and accumulators.

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2. The sound pressure dB(A) at rated conditions shall be a value of 58 decibels at 3 feet from the front of the unit. The outdoor unit shall be capable of operating at further reduced noise during night time.
3. The system will automatically restart operation after a power failure and will not cause any settings to be lost, thus eliminating the need for re-programming.
4. The following safety devices shall be included on the condensing unit; high pressure switch, control circuit fuses, crankcase heaters, fusible plug, high pressure switch, overload relay, thermal protectors for compressor and fan motors.
5. The outdoor unit shall be capable of heating operation at 0°F dry bulb ambient temperature without additional low ambient controls.

B. Unit Cabinet:

1. The outdoor unit model shall be completely weather proof and corrosion resistant. The unit shall be constructed from rust-protected mild steel panels coated with a baked enamel finish.

C. Fan:

1. The condensing unit shall consist of one propeller type, direct-drive fan motor.
2. The fan motor shall have inherent protection and permanently lubricated bearings and be mounted.
3. The fan motor shall be provided with a fan guard to prevent contact with moving parts.

D. Condenser Coil:

1. The condenser coil shall be manufactured from copper tubes expanded into aluminum fins to form a mechanical bond.
2. The coil shall be of a waffle louver fin and high heat exchanger, rifled bore tube design to ensure highly efficient performance.
3. The coils shall be complete with corrosion treatment. The thickness of the coating must be between 2.0 to 3.0 microns.

E. Compressor:

1. Each compressor shall be equipped with a crankcase heater, high pressure safety switch, and internal thermal overload protector.
2. Oil separators shall be standard with the equipment together with an oil balancing circuit.
3. The compressor shall be mounted to avoid the transmission of vibration.

F. Electrical:

1. The power supply to the outdoor unit shall be 208/230 volts, 60 hertz.
2. The control voltage between the indoor and outdoor unit shall be 24VDC.
3. The control wiring shall be a two-wire multiplex transmission system, making it possible to connect multiple indoor units to one outdoor unit with one 2-cable wire, thus simplifying the wiring operation.

2.3 INDOOR UNIT

A. Indoor Unit:

1. The indoor unit shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve,

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control circuit board, fan motor thermal protector, flare connections, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch.

2. Both refrigerant lines shall be insulated from the outdoor unit.
3. The indoor unit will be separately powered with 208~230V/1-phase/60Hz.
4. The voltage range will be 253 volts maximum and 187 volts minimum.

D. Fan:

1. The fan motor shall operate on 208/230 volts, 1 phase, 60 hertz with a motor output range 0.21, 0.36 and 0.58 HP respectively.
2. The air flow rate shall be available in high and low settings.
3. The fan motor shall be thermally protected.

E. Coil:

1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
2. The refrigerant connections shall be flare connections and the condensate will be 1-1/4 inch outside diameter PVC.

F. Electrical:

1. A separate power supply will be required of 208/230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.

G. Accessories :

1. A condensate pump.

2.4 EXHAUST FANS – ROOF MOUNTED:

- A. Exhaust fan shall be factory assembled, low silhouette, steel housing for curb mounting on roof and shall be completely weatherproofed. Exhaust fan shall have physical arrangement and capacity shown on drawings. Unit shall be Greenheck, or equal.
- B. Wheel shall be backwardly inclined, centrifugal type, constructed of steel or aluminum and have been statically and dynamically balanced.
- C. Housing shall be designed for curb mounting with the motor installed in a totally enclosed weatherproof compartment outside of air stream.
- D. Drive shall be belt driven as shown on drawings. Motor shall be in accordance with this section.
- E. Accessories shall include backdraft damper, bird screen over entire air outlet of fan, and prefab roof mounting curb.
- F. Rating shall be in accordance with the appropriate AMCA approved test codes and procedures and bear the AMCA Certified Rating Seal.

2.5 MOTORS

- A. Motors shall be built to the specification of NEMA. The motor shall be ball bearing, drip proof, squirrel cage induction type, to operate at speeds not to exceed 1,750 rpm, except when indicated otherwise. The motors shall operate at current listed on the drawings. Motors mounted outdoors shall be totally enclosed (TEAO). The minimum service factor shall be designed to operate in ambient temperatures up to 150 degrees F. All single-phase motors shall have built-in thermal overload protection. Motors of one horsepower and above, which are not part of a hermetically sealed system, shall be Premium Efficiency type as defined by NEMA Test Standard MG112.53A (IEEE-112 Test Method B), using segregated loss determination.
- B. Starters shall be across-the line or part winding type, as required, with overload protection on all legs, and shall be manual or magnetic. Starters shall be complete with NEMA type 1 enclosure, with built-in "Hand-Off-Automatic" switch. Magnetic starters exposed to weather shall have NEMA IV enclosure.

2.6 AIR DISTRIBUTION

- A. Ceiling supply diffusers shall be multiple-core construction with core modules removable and rearrangeable to adjust direction of throw on any portion of the diffuser. Diffuser shall be adapted to a filler panel assembly for inverted T-bar installation with perforated face panel and surface mounted type as indicated on the drawings. Diffusers shall be Krueger, Price, Titus or equal.
- B. Sidewall supply air registers shall be double deflection type with horizontal front blades. Construction shall be steel. Registers shall be Krueger, Price, Titus or equal.
- C. Return and exhaust air registers and grilles shall have horizontal blades at 3/4 inch centers. Return registers shall be adapted for inverted T-bar installation or surface mounted type as indicated on drawings. Construction shall be steel. Registers and grilles shall Krueger, Price, Titus, or equal.
- D. Diffusers, grilles and registers size, capacity and throw shall be as indicated on the drawings.
- E. All supply diffusers, grilles and registers shall be fitted with extractor or deflector at all takeoff connections from ducts.
- F. Factory applied finish shall be white baked enamel.

2.7 REFRIGERANT PIPING AND ACCESSORIES

- A. Material and dimensional requirements for field-assembled refrigerant piping valves, fittings and accessories shall conform to ASHRAE 15 & 34. Provide components as recommended by the equipment manufacturer.
- B. Provide seamless copper tubing, hard drawn, Type "L" for the liquid, suction and discharge gas lines. Provide solder joint fittings with brazing filler material. When cutting copper piping, pipe needs to be clean and reamed of all burrs and debris prior to Brazing. When brazing copper piping Nitrogen must be used during the Brazing process to prevent oxidation and in compliance with equipment manufacturer's literature and recommendations - typical for all.
- C. 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.

2.8 DUCTWORK AND ACCESSORIES

- A. All ducts shall be prime quality, galvanized steel and shall be lock-forming quality (LFQ) with a galvanized coating of 1-1/4 ounces total for both sides of 1 square foot of sheet. Round ducts and fittings shall be galvanized steel of spiral construction. The elbows shall be a minimum of 1.5 times the duct radius.
- B. Flexible duct shall be factory fabricated assembly, consisting of a galvanized spring steel wire helix, covered with a continuous non-perforated air sealed liner, wrapped with glass fiber insulation, 1-1/2" thick ($K = 0.25 @ 75 \text{ degrees F}$). The assembly shall be enclosed in a Class 1, fire resistive, vapor barrier jacket, factory sealed at both ends. Individual lengths of flexible ducts shall be a maximum of seven feet long and shall include factory fabricated steel collars.
- C. Duct connections to fans, blowers and air handling units shall be made with flexible duct connector of approved design, with a minimum distance of 2 inches between ducts and fans, and minimum 1/2 inch slack in flexible material. Flexible connectors shall be heat-resistant and waterproof glass fiber with a non-porous fire-resistant neoprene coating (both sides). Material shall be approved by State of California Fire Marshal and Underwriter's Laboratories. Connection shall be easily removable with an ordinary screwdriver. Connections shall be Ventglass, Ventfabrics, Neoprene by Duro-Dyne, or equal. Flexible material shall overlap minimum 2 inches at seam and shall be closed air tight.
- D. Volume dampers shall be manufactured of 16 gauge sheet metal with locking quadrants. Volume dampers shall be opposed blade type. Where dimension of duct exceeds 19 inches by 12 inches, blades shall not be over 8 inches wide. Bearing shall be provided; holes punched in ductwork to serve as bearings will not be accepted. Damper quadrant sizes shall be as follows: Up to 40 square inches shall be 1/4 inch quadrant, up to 18 inches wide by 12 inches high shall be 3/8 inch quadrant, and over 18 inches by 12 inches shall be 1/2 inch quadrant. Dampers shall be caulked in the ducts to avoid by-pass. Damper blade position on all dampers shall be indicated by filing a notch in the exposed operation rod or splitter damper rod. Volume control dampers shall be installed in all branch ducts, whether shown on drawings or not, to allow balancing of the system. Where dampers, frames and blades constitute an obstruction in excess of 15% of the duct area, the duct shall be increased in size to receive the dampers.
- E. Duct access doors to all fire dampers shall be insulated access doors, as manufactured by Ventfabrics, Inc., Duro-Dyne, or equal. Doors shall be 24 gauge metal; 18 gauge frame; insulated 1/2 inch fiberglass; covered with 28 gauge metal; with loose pin hinges; and latches. Access doors shall be Ventfabric, Duro-Dyne, or equal. Door frame shall contain felt gasket, and a sponge rubber gasket shall be attached to back of each door frame to insure tight seal between duct and frame. Finish shall be factory applied. Service shall be stenciled on door, e.g., "Fire Damper" in 1/2 inch letters. Size shall be 18 inch by 12 inch where space and duct size permit. On small ducts and in restricted space, 12 inch by 12 inch may be used.
- F. Volume damper inaccessible above ceiling and other locations shall be equipped with Ventfabrics No. 666, Duro-Dyne SRC, or equal, concealed type regulator with zinc-plated cover suitable for painting or equivalent instead of the locking damper quadrant specified above.

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2.9 INSULATION

A. Duct Insulation

1. All insulation materials shall have flame spread of not more than 25 and a smoke-developed rating of not more than 50.
2. All concealed supply ducts shall be insulated with Manville "Micro Lite", Owens-Corning Fiberglass or equal, fiberglass duct insulation with "FSK" foil skim kraft vapor barrier facing, factory applied. Insulation shall have an "R" factor of 4.0 minimum.
3. All concealed return ducts shall be insulated as per supply ducts, but vapor barrier facing may be replaced with Class 1 vinylfacings.
4. Ducts and plenums where indicated on the drawings shall be lined with Manville Mat faced "Lina-Coustic" Standard, Owens-Corning fiberglass "Aero Flex", or equal. Lining shall have an "R" factor of 4.0 minimum.

B. Refrigerant Pipe Insulation

1. All insulation materials shall have flame spread of not more than 25 and a smoke-developed rating of not more than 50.
2. Refrigerant piping shall have a thermal conductivity of 0.25 BTH-in/hr ft² °F and a water vapor transmission of 0.05 perm-inch. Refrigerant piping shall be wrapped with Armaflex FS, or equal.

PART 3 EXECUTION

3.1 GENERAL

- A. All work shall be performed by skilled mechanics, under the supervision of a competent foreman and in accordance with the best standards of practice of the trade.

3.2 EQUIPMENT INSTALLATION

- A. The installation of AC units, exhaust fans, and other equipment specified or shown on drawings shall be strictly in accordance with the manufacturer's instructions and installation book. All recommendations of manufacturer shall be followed, required clearances maintained, and factory approval secured for each installation. All equipment shall be securely fastened to its base. A copy of the manufacturer's installation and service manual shall be kept with each piece of equipment at all times to determine if the installation meets requirements.
 1. All mechanical equipment shall be braced or anchored to resist horizontal force acting in any direction using the following criteria.

Fixed Equipment on Grade	30% of Operating Weight
Fixed Equipment on Structure	45% of Operating Weight
 2. For Closely Restrained, Flexibly Mounted Equipment, use 2x the above values. Simultaneous Vertical Force, use 1/3 x horizontal force. Where anchorage details are not shown on Drawings for equipment over 500 pounds, the field installation shall be subject to the approval of the Owner's Representative.
 3. Seismic Bracing and anchorage of ducts and piping shall be in accordance with sheets 1-48 of "Guidelines for Seismic Restraints of Mechanical Systems and Plumbing Piping Systems", published by SMACNA and approved by Owner's Representative.

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- B. Air Conditioning Units and Apparatus must be kept covered and clean during construction; required clearances maintained when installed for compressors, motor and filter service; duct connections to units sealed air tight with caulking or canvas and lagging adhesive; condensate drains installed to nearest receptor for all AC Units, drains must be trapped, depth of trap to equal 1-1/2 times system operating pressure.
- C. Air Distribution
 - 1. Diffusers, Registers and Grilles in walls or ceilings of plaster or drywall shall be provided with plaster grounds of 24 gauge galvanized steel to receive screws where removable frames are not specified.
 - 2. Terminal Connection to ductwork shall be sealed securely with lagging adhesive and canvas or with caulking compound.
 - 3. Extractors shall be adjusted to even the air flow across the face of the terminal.
 - 4. Visible ducts behind grilles, registers and diffusers shall be painted flat black.
 - 5. Any accessible screws shall have a drop of super glue placed on the thread.

3.3 DUCTWORK INSTALLATION

- A. Ductwork fabrication and installation shall conform to the recommendation of the latest edition of the HVAC Duct Construction Standards, as published by the Sheet Metal and Air Conditioning Contractors National Assoc., Inc., (SMACNA). These standards shall govern type of seams and joints, reinforcing and supports, corner closures duct hangers, elbows, turning vanes (use double vane-type), tapers offsets; streamliners, branches from mains, tee connections, register grille and ceiling diffuser connections, volume dampers, access doors in ducts and plenums.
- B. Sheet Metal Installation: All necessary allowances and provisions shall be made in the installation of the ducts for the structural condition of the building, and ducts shall be transformed or divided as may be required, and where necessary to do this, the required area shall be maintained. All of these changes, however, shall be approved and installed as directed by the Owner's Representative. During the installation, the open ends of ducts shall be protected to prevent debris and dirt from entering same. Contractor shall install this work in accordance with the approved progress schedule and in cooperation with others, so there will be no delay in other trades.
- C. All ducts shall be sealed airtight by covering all duct joints and connections to equipment with a 4 inch minimum width of 6 ounce canvas pasted in with lagging adhesive or high pressure duct sealer. Duct exposed in non-conditioned spaces shall have canvas and lagging painted with aluminum paint to match adjacent galvanized duct. Duct exposed in conditioned spaces need not be sealed.
- D. Ducts passing through floors shall be sealed off in an approved manner, preserving both the fire rating of the structure and to prevent air or water leakage or transfer of noise between floors.
- E. All supply and return duct seams and joints exposed to weather shall be caulked watertight with acrylic sealant and shall have 4 inch minimum width of 6 ounces canvas pasted on with lagging adhesive.

- F. Volume control dampers shall be installed in all branch ducts, whether shown on drawings or not, to allow balancing of system and adjust air quantities to all supply, return and exhaust outlets and outside air intakes. Dampers provided with outlets shall not be used for balancing.
- G. Flexible duct shall be installed in a fully extended condition, free of sags and kinks, and, as far as practical, using only the minimum length required to make the connection. Flexible ducts shall be supported independently of the air outlets, and where horizontal support is required, shall be suspended on 36-inch centers with a minimum 3/4 inch wide flat banding material. Connection of flexible duct (termination connections and joints) shall be made with 1/2 inch wide positive locking steel straps.

3.4 INSULATION INSTALLATION

A. Duct Insulation

1. Before installing duct insulation, sheet metal ducts shall be clean, dry and tightly sealed at all joints and seams.
2. Duct wraps shall be cut to "stretch-out" dimensions as provided in manufacturer's instructions, and a 2" piece of insulation removed from the facing at the end of the piece of insulation to form an overlapping staple and tape flap. Install with facing outside so tape flap overlaps insulation and facing at other end. Insulation shall be tightly butted. If ducts are rectangular, install so insulation is not excessively compressed at duct corners. Seams shall be stapled approximately 6" on center with outward clinching staples then taped. On supply ducts with vapor barrier facing, the tape shall be vapor barrier tape. On return ducts with vinyl facing, duct tape is acceptable. Seal all seams, tears, punctures and other penetrations of the insulation facing with tape, as described above. Where rectangular ducts are 18" or wider, duct wrap shall be secured to the bottom of the duct with mechanical fasteners spaced a maximum of 12" on center.
3. All duct dimensions shown on drawings are net clear inside and shall be increased to accommodate lining.

3.5 ELECTRICAL WORK

A. Items covered under Electrical Section of Work:

1. All power wiring, conduits and connections serving motors, to disconnect switches for control circuits, and to control panels which are equipment mounted.
2. Disconnect switches shall be furnished, installed, wired and connected.
3. Wiring, gutters, junction boxes, outlets and miscellaneous devices shall be furnished, installed, wired and connected.
4. Final power connections to electrical power driven equipment.

B. Items covered under Mechanical Section of Work:

1. All power wiring, conduits and connections serving motors on automatic (temperature) control devices and to control panels which are not factory mounted.
2. All automatic (temperature) control and interlock wiring, regardless of voltage and conduits for same, necessary for proper operation of equipment, shall be furnished, installed, wired and connected. This includes interlock wiring between motor starter, coils, interlocking relays, magnetic contractors, equipment control panels and temperature control devices.
3. Control transformer, push buttons, toggle switches, temperature control devices, etc., shall be furnished, installed, wired and connected.

C. Items covered under both Mechanical and Electrical Section of Work:

1. It shall be the responsibility of both Contractors to provide equipment with the proper electrical characteristics for the electrical service provided. All necessary electrical components to provide a complete system shall be furnished.

3.6 TEST AND BALANCE

A. The Mechanical Contractor shall in general, cooperate with the Test and Balance Agency and specifically Paragraph 1.07 of Section 15990 of the specifications.

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SECTION 23 03 00

BASIC MECHANICAL REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. This specification and the applicable drawings are intended to define the requirement to furnish all labor, materials, equipment, supplies, and other cost as necessary for the satisfactory completion of all work pertaining to mechanical trades.

1.2 RELATED DOCUMENTS

- A. All work shall comply with the requirements of codes, ordinances and regulations of the government having jurisdiction at the location of work, including the regulations of serving utilities.
- B. The latest approved editions of the following specifications and standards shall form a part of this specification, the same as if herein written out in full, and all materials and installations shall conform to the applicable requirements thereof:
 - 1. All state and municipal ordinances having jurisdiction
 - 2. California Code of Regulations (CCR), Title 8
 - 3. California Code of Regulations (CCR), Title 19
 - 4. California Code of Regulations (CCR), Title 24
 - 5. National Fire Protection Association (NFPA) Pamphlet No. 13
 - 6. National Fire Protection Association (NFPA) Pamphlet No. 90A & 90B
 - 7. National Electric Code (NEC)
 - 8. Occupational Safety and Health Administration (OSHA) "Safety and Health Regulations for Construction"
 - 9. California Mechanical Code (CMC)
 - 10. California Plumbing Code (CPC)
- C. The latest specifications and standards of the following associations shall form a part of this specification, the same as if herein written out in full, and all materials, equipment and installations shall conform to the applicable requirements thereof.
 - 1. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Underwriters Laboratories, Inc. (UL)
 - 2. Air Moving and Control Association (AMCA)
 - 3. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)
 - 4. American Gas Association (AGA)
- D. The following Division 22 & 23 Sections shall form a part of this specification.

Section 22 0000	Plumbing
Section 23 0000	HVAC Equipment & Systems
Section 23 0593	Testing, Adjusting, and Balancing for HVAC Systems
Section 23 0923	Direct Digital Control System
Section 23 3500	Overhead Vehicle Exhaust Removal System

1.3 DEFINITIONS

- A. "Piping" shall mean pipes, fittings, valves and all piping specialties that are used in conveying system media.
- B. Pressure ratings specified is the design working pressure for the fluid which the device will serve.
- C. "Ductwork" shall mean ducts, plenums, compartments, castings, or any like devices, which are used to convey air.

1.4 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00, if applicable, and as follows.
- B. All material and equipment used in the installation shall be new and in perfect condition when installed. Material, equipment and components shall be standard catalog type products from reputable manufacturers regularly engaged in the manufacturing of such equipment. All articles provided for the same general purpose or use shall be the same make. Submittal of any equipment for approval shall specifically indicate any item that does not meet the specification requirements. Removal of installed articles may be required if the article is later found not in conformance with the specification requirements.
- C. Space allotted, clearances, access, electrical data, structural supports, etc. shown on drawings is for equipment models and sizes listed in schedules and/or in specifications. Contractor shall verify these conditions on all non-listed equipment submitted for approval.
- D. Unless otherwise specifically directed in the applicable Division 22 or 23 sections, the submittals by the Contractor to the Owner's Representative shall be as follows:
 - 1. Submit manufacturer's catalog data for all purchased items, indicating size, model, options, etc, of the item to be used.
 - 2. Submit drawings for non-purchased items that have to be fabricated.
 - 3. Submit shop drawings of ductwork and piping layouts

1.5 PERMITS AND FEES

- A. The contractor shall arrange, apply for, and pay for all permits, inspections, fees, and licenses required by any legally constituted public authority for this work.

1.6 DISCREPANCIES

- A. Any discrepancies found between the specification and drawings, or between drawings, shall be brought to the attention of the owner or his representative before installation of the applicable item. Special attention shall be given to voltage requirements and lighting arrangements. Any conflict shall be called to the attention of the Owner's Representative immediately. Any extra cost caused by neglecting to verify all listed voltages and phase with electrical plans shall be the responsibility of the Contractor.

1.7 GUARANTEE

- A. Contractor shall provide a written guarantee that all materials, fixtures, and equipment installed under the contract are guaranteed for a period of one year from the date of completion. Contractor shall provide all materials and labor necessary for repair, in a reasonable amount of time, and without cost to the owner.

PART 2 PRODUCTS

2.1 EQUIPMENT

- A. All mechanical equipment, both hanging and base mounted, shall be provided with mounting connection points of sufficient strength to resist seismic forces, as required by CCR Title 24. The mounting connections shall be compatible with vibration isolation used.
- B. Equipment identification number, capacity, and design requirements are specified in the drawing equipment schedule or applicable specification. Equipment furnished and installed shall meet the design requirements at operating conditions with the following parameters:
 - 1. The RPM, motor horsepower, brake horsepower, air pressure drop, water pressure drop, equipment weights, outlet velocities, tip speed and dB ratings specified are maximum. An increase will not be accepted.
 - 2. The CFM, wheel diameters, heating and cooling capacities, and static pressure on fans that are specified are minimums. A decrease will not be accepted.

2.2 RECORD DRAWINGS

- A. The contractor shall maintain a complete "as-built" record set of blue line prints during construction. The "as-built" prints shall be used to record the exact location of all piping and ducting installed, including the depth of all underground piping. Upon completion of the project contractor shall deliver a clean set of "as-built" prints to the owner or his representative.

2.3 MANUALS AND INSTRUCTIONS

- A. The Contractor shall furnish five sets of Operating and Maintenance Manuals. The information in these manuals shall be bound in a hardback, loose-leaf binder or approved equivalent. Inscribed on the cover shall be the words "OPERATING AND MAINTENANCE MANUAL", the name and location of the building or project, and the name of the Contractor. The following shall be included in the Manual:
 - 1. The names, addresses and telephone numbers of each sub contractor that installed equipment and/or systems, and the local representative for each major item of equipment.
 - 2. Information assembled with tab sheets to conform to a Table of Contents.
 - 3. Manufacturer's literature for all mechanical equipment. All equipment shall be identified by make, model and serial number. Electrical characteristics shall be noted and a complete parts list included.

4. Operating Instructions: Provide a brief description of the system including proper setting of switches and other equipment. This may be provided as part of the manufacturer's literature. If included in literature, provide an index indicating on what page each item is located. Adjustments requiring the technical knowledge of the service agency personnel need not be included.
5. Maintenance Instructions: Provide a list of each item of mechanical equipment requiring inspection, lubrication or service, with a description of the schedule and performance of such maintenance, including types of lubricant for each item of equipment. This may be provided as a part of the manufacturer's literature. If included in literature, provide an index indicating on what page each item is located.
6. Controls: Provide system control drawings including complete catalog data, calibration information, spare parts lists, etc. A typewritten sequence of operation shall be included with the diagrams referring to component numbers or designations thereon. For DDC systems, the computer designation shall be provided for all points installed.

- B. Posted Operation Instructions: Operating Instructions shall be provided at all control panels and shall include control diagrams and sequence of operation.

PART 3 EXECUTION

3.1 GENERAL

- A. Locations: The locations of the mechanical work and equipment as indicated on the drawings are approximate only, and the required final exact positions shall be verified with the Owner's Representative prior to installation. All changes in locations of equipment shall be subject the approval of the Owner's Representative.
- B. Accessibility: All equipment shall be installed so as to be accessible for maintenance and adjustment (crawling under or over ductwork is not acceptable). Special attention shall be given to motors, belts, air filters, manual valves and control valves, operating dampers, coils, etc. This section of specifications shall be responsible for the supplying and installation of all required access panels.
- C. Noise and Vibration: It is the intent of the specification and design conditions that the entire system, including equipment, air ducts, piping and all other parts, shall be free of excessive vibrations. If excessive vibration occurs as a result of installation, it shall be the responsibility of the Contractor to correct these conditions at no cost to the Owner.
- D. Coordination: Before proceeding with installation of piping and ductwork, Contractor shall inspect the Contract Drawings and determine that the location of the work does not interfere with work of other trades. In case of interference, contractor shall notify the Owner's Representative in writing and his decisions shall govern.
- E. Structural Members: Where piping passes through or interferes with slabs, beams or any structural member, or where cutting of structure is required, the Owner's Representative shall be consulted. No cutting of structural members shall be done without approval from the Owner's Representative. When pipes are placed in partitions necessitating cutting of any structural member, metal ties shall be provided, in accordance with applicable structural code.

3.2 EQUIPMENT INSTALLATION

- A. Obtain manufacturer's printed installation instructions to aid in properly executing work of installing equipment whenever such instructions are available. Submit three copies of such instructions to the Owner's Representative prior to time of installation for use in supervising the work.
- B. All recommendations of the manufacturer shall be followed and required clearances maintained. All equipment shall be securely fastened to its base. A copy of the manufacturer's installation and service manual shall be kept with each piece of equipment, to allow Owner's Representative to determine if the installation meets requirements.
- C. Erect equipment in a neat manner such as aligning, leveling and adjusting for satisfactory operation. Install equipment so that connecting and disconnecting of piping and accessories can be made readily, and so that all parts are easily accessible for inspection, operation, maintenance and repair. Minor deviation from arrangements shown on drawings may be made, as approved by the Owner's Representative.
- D. Rotating or reciprocating mechanical equipment shall be mounted on or suspended from vibration isolators to prevent vibration and structural borne noise transmission to the building. Refer to each mechanical section of these specifications for details. All vibration isolators shall be pre-approved. Unless otherwise noted, flexible duct connectors shall be used between all fan openings and sheet metal work, and flexible piping connectors shall be used between all rotating mechanical equipment and piping systems.
- E. Provide seismic restraints for all mechanical equipment, piping, and ductwork in accordance with CCR Title 24, Part 2, Volume 2, Chapter 16A Paragraph 1615A.

3.3 ADJUSTMENT AND OPERATION OF SYSTEM

- A. When the work included in this specification is complete, and at such time as directed by the Owner's Representative, the Contractor shall adjust all parts of the system, advising the Owner's Representative when this has been done and the work is ready for their final tests. Refer to Section 23 05 93 "Testing, Adjusting, and Balancing for HVAC Systems".
- B. If it becomes necessary for temporary use of a system before completion, the Contractor shall adjust all parts as far as possible in order to make temporary use as effective as possible. After temporary use and before acceptance tests, all systems shall be readjusted to meet permanent operational requirements.
- C. Operation Test: The Contractor shall conduct an operation test to demonstrate that all building systems have been completed and perform in compliance with contract requirements. This test shall be performed under simulated operating conditions for one consecutive twenty-four hour period and maybe witnessed by the Owner's Representative at his option.
- D. Test Cost and Results: The cost of utilities, material, and qualified operating personnel shall be borne by the Contractor. The Contractor shall provide written notice to the Owner's Representative at least five (5) days prior to starting the test and shall provide a written record of test results using recording type instruments where practical.

- E. Verbal Operating Instructions: Upon completion of work, and at a time designated by the Owner's Representative, a competent representative from each supplier of major equipment items shall instruct a representative of the Owner in the operation and maintenance of the equipment supplied by his company. The minimum instruction time shall be one 4-hour period for air handling units, one 8-hour day for chillers, one 4-hour period for pumps and one 8-hour day for temperature control systems.
- F. Certification: After completion of air and water balancing operations, the authorized representative for each type of equipment shall check the equipment operation and shall certify that the equipment is operating properly.

3.4 CLEANING OF EQUIPMENT AND PREMISES

- A. Contractor shall thoroughly clean all equipment and apparatus and leave in satisfactory condition for finishing and painting. If equipment has been supplied with factory finish, Contractor shall be responsible for touchup work and/or refinishing if required. During construction, contractor shall be responsible for clean up of cartons, scrap or debris caused by his work, and complete cleanup of the area after each day of work.
- B. Each air handling system shall be thoroughly cleaned before being put into operation, either by vacuum cleaning or blowing out with a pressure blower.

END OF SECTION

SECTION 23 05 93

TESTING, ADJUSTING & BALANCING

PART 1 GENERAL

1.1 SUMMARY

- A. The work in this section includes the adjusting and balancing of all heating, ventilation and air conditioning systems.
- B. The General Contractor will select and employ an impartial, independent balancing agency to provide testing and balancing services for the heating, ventilating and air conditioning system of this project. These services will be paid for by the General Contractor. Final approval of the balancing agency shall be the Owner's Representative. The balancing agency will have a contractual relationship with the General Contractor.
- C. The schedule for testing and balancing the HVAC systems shall be established by the General Contractor in coordination with the balancing agency. It is the balancing agency's responsibility to initiate this continuing coordination to determine his schedule for the final testing and balancing services and the periodic inspections required during construction.

1.2 REFERENCE TO OTHER SECTIONS

- A. The applicable requirements from the following sections shall form a part of balancing of air and water system work and the agency shall consult them in detail for general and specific requirements.

Section 23 0000	HVAC Equipment and Systems
Section 23 0923	Direct Digital Control System
Section 23 3500	Overhead Vehicle Exhaust Removal System

1.3 QUALIFICATIONS OF THE BALANCING AGENCY

- A. The balancing agency shall be a member of the Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB).
- B. To perform required professional services, the balancing agency shall have a minimum of one Test and Balance Engineer certified by the Associated Air Balance Council or the National Environmental Balancing Bureau.
- C. This certified Test and Balance Engineer shall be responsible for supervision and certification for the total work herein specified.
- D. The balancing agency shall submit records of experience in the field of air and hydronic system balancing or any other data as requested by the Owner's Representative. The supervisory personnel for the firm shall have at least two (2) years experience, and all the employees used in this project shall be qualified technician in this specific field.
- E. The balancing agency shall furnish all necessary calibrated instrumentation to adequately perform the specified services. An inventory of all instruments and devices in possession of the balancing agency may be required by the Owner's Representative to determine the balancing agency's performance capability.

- F. The balancing agency shall have operated for a minimum of two (2) years under its current name.

1.4 STANDARDS

- A. The balancing agency shall perform the services specified herein in accordance with the Associated Air Balance Council's or National Environmental Balancing Bureau's NATIONAL STANDARDS, including revisions, to the date of the contract.
- B. All terms in this specification shall have their meaning defined as stated in the NATIONAL STANDARDS.
- C. If these specifications set forth more stringent requirements than the NATIONAL STANDARDS, these specifications shall prevail.

1.5 DOCUMENTS

- A. The Owner's Representative will provide the balancing agency one (1) copy of the following documents:
 1. Project drawings (mechanical sepias if requested) and specifications.
 2. Approved construction revisions pertaining to the HVAC systems.
 3. Approved submittal data on HVAC equipment and systems to be installed by the Mechanical Subcontractor.
 4. Approved HVAC shop drawings.
 5. Approved HVAC wiring diagrams, control diagrams, and equipment brochures, as appropriate.

1.6 COORDINATION

- A. It will be necessary for the balancing agency to perform its services in close coordination with the Mechanical Subcontractor.
- B. The plans and specifications have indicated meters, valves, dampers, and other devices for the purposes of adjusting the system to obtain optimum operating conditions. It will be the responsibility of the Mechanical Subcontractor to install these devices in a manner that will leave them accessible and readily adjustable. The balancing agency shall provide guidance if there is a questionable arrangement of a control or balancing device.
- C. The General Contractor, Mechanical Contractor, DDC Control Subcontractor, and the suppliers of the HVAC equipment shall all cooperate with the balancing agency to provide all necessary data on the design and proper application of the system components. In addition, they shall furnish all labor and materials required to eliminate any system deficiencies.

1.7 RESPONSIBILITIES OF THE MECHANICAL CONTRACTOR

- A. The Mechanical Contractor shall complete the installation and start all HVAC systems to ensure they are working properly, and shall perform all other items as described hereinafter, to assist the balancing agency in performing the testing and balancing of the HVAC systems. The Mechanical Contractor shall put all HVAC systems and equipment in full operation and shall continue the operating of them during each working day of testing and balancing.

B. Air Distribution Systems

1. Verify installation for conformity to design.
2. Terminate all supply, return and exhaust ducts, and pressure test them for leaking, as required by specification.
3. Ensure that all splitters, extractors, and volume and fire dampers are properly located and functional. Dampers serving requirements of minimum and maximum outside, return, relief, and exhaust air shall provide tight closure and full opening, with a smooth and free operation.
4. Verify that all supply, return, exhaust, and transfer grilles; registers' diffusers; and high-pressure terminal units are installed and operational.
5. Ensure that air-handling systems, units, and associated apparatus, such as heating and cooling coils, filter sections, access doors, etc., are blanked and/or sealed to eliminate excessive by-pass or leakage of air.
6. Ensure that all fans (supply, return, relief, and exhaust) are operating and free of vibration. All fans and drives shall be checked for proper fan rotation and belt tension. Overload protection shall be of proper size and rating. A record of motor current and voltage shall be made to verify that the motors do not exceed nameplate rating.
7. Make any necessary changes to the sheaves, belts, and dampers, as required by the balancing agency, at no additional cost to the Owner.
8. Install clean filters.

1.8 RESPONSIBILITIES OF THE DDC CONTROL CONTRACTOR

- A. The DDC Control Contractor shall complete the installation of the DDC control system, operate and test all control systems to ensure they are functioning properly as designed. The DDC Control Contractor shall assist the balancing agency in testing and balancing the HVAC systems, as described hereinafter.
1. Verify that all control components are installed in accordance with project requirements and are functional, including all electrical interlocks, and damper sequences.
 2. Verify that all controlling instruments are calibrated and set for design operating conditions.
 3. Calibrate room thermostats after installation, and before the thermostat control verification tests are performed. The balancing agency shall prove the accuracy of final settings by taking temperature readings. The readings shall be in a typical conditioned space for each separately controlled zone.
 4. The DDC Control Contractor shall allow sufficient time in the project to provide assistance and instruction to the balancing agency in the proper use and setting of control components such as, but not limited to, computers, static pressure controllers, or any other device that may need set points changed, so that the testing and balancing work can be performed.

1.9 NOTIFICATION FOR TESTING AND BALANCING WORK TO BEGIN

- A. The General Contractor shall notify the balancing agency in writing when all heating, ventilating, and air conditioning systems are complete and ready for testing and balancing. The Mechanical Contractor shall attest that he has completed all items as described in Section 1.07 of these specifications.

- B. If, upon commencing the work, the Balancing Contractor finds that the systems are not ready, or if a dispute occurs as to the readiness of the systems, the balancing agency shall request an inspection to be made by the Mechanical Engineer. This inspection shall establish, to the satisfaction of the represented parties, whether or not the systems meet the basic requirements for testing and balancing. Should the inspection reveal the notification to have been premature, all costs for the inspection and work previously accomplished by the balancing agency shall be paid for by the General Contractor. Furthermore, such items that are not ready for testing and balancing shall be completed and placed in operational readiness before testing and balancing services shall again be requested.

1.10 QUANTITIES

- A. In all cases where a device, operation, procedure, tool, equipment, or part of the equipment is herein referred to in the singular number, it is intended that such reference shall apply to as many such devices as required to complete the testing and balancing specified herein.

PART 2 RESPONSIBILITIES OF THE BALANCING AGENCY

2.1 SCOPE

- A. In accordance with Project Drawings and Specifications and as specified herein, the balancing agency shall provide all supervision, personnel, instruments, calibration equipment, and all other materials and services necessary to perform all testing and balancing of the heating, ventilating, and air conditioning systems. All test data, including all pertinent calculations, shall be reported on appropriate forms.

2.2 GENERAL

- A. The testing and balancing of the heating, ventilating, and air conditioning systems shall be performed by an independent balancing agency approved by the Owner's Representative. The balancing agency shall have a minimum of two years specialized experience in air and hydronic system balancing, and possess calibrated instruments, qualified Test and Balance Engineers, and skilled technicians to perform all required tests. The balancing agency shall be a certified member of the Associated Air Balance Council.
- B. The tests shall demonstrate the specified capacities and operation of all equipment and materials comprising the systems. The balancing agency shall then make available to the Owner's Representative such instruments and technicians as are required for spot checks of the system.
- C. The balancing agency shall not instruct or direct the Mechanical Contractor in any of the work. Any proposed changes or revision in the design shall be submitted to the Architect and Resident Engineer in writing. The Architect and Resident Engineer shall, in coordination with his Engineer, process the proposal as appropriate.

2.3 SERVICES

- A. Preliminary Report: Review plans and specifications prior to installation of any of the affected system. Submit a written report to the General Contractor indicating any deficiencies in the system that would preclude the proper adjusting, balancing, and testing of the system.

- B. During construction, the balancing agency shall inspect the installation of pipe systems, sheet metal work, temperature controls and other component parts of the heating, ventilating, and air conditioning systems. The inspections shall be performed periodically as the work progresses. A minimum of two inspections are required as follows: (1) when 60% of the duct work is installed; (2) when 90% of the equipment is installed. The balancing agency shall submit a brief written report of each inspection to the Owner's Representative.
- C. Upon completion of the installation and start-up of the mechanical equipment by the Mechanical Contractor, the balancing agency shall test and balance the system components to obtain optimum conditions in each conditioned space in the building. If construction deficiencies are encountered that preclude obtaining optimum conditions, and the deficiencies cannot be corrected by the Mechanical Contractor within a reasonable period of time, the balancing agency shall cease testing and balancing services and advise the Owner in writing of the deficiencies.

2.4 AIR SYSTEM PROCEDURES

- A. The balancing agency shall perform the following testing and balancing functions in accordance with the Associated Air Balance Council's NATIONAL STANDARDS:
 1. Fan Speeds: Test and adjust fan RPM to achieve design CFM requirements.
 2. Current and Voltage: Measure and record motor current and voltage.
 3. Pitot Traverse: Perform a Pitot tube traverse of main supply and return ducts to obtain total CFM.
 4. Outside Air: Test and adjust system minimum outside air by Pitot tube traverse. If a Pitot tube traverse is not practical, the percentage of outside air may be determined by calculations from the return air, outside air, and mixed air temperatures. Make allowances for heat of compression and motor heat where applicable.
 5. Static Pressure: Test and record system pressures, including suction and discharge static pressure of each fan.
 6. Air Temperature: Take wet-bulb and dry-bulb air temperatures on the entering and leaving side of each cooling coil. Dry-bulb temperature shall be taken on the entering and leaving side of each heating coil.
 7. Zone Ducts: Adjust zone ducts to within design CFM requirements. At least one zone balancing damper shall be completely open.
 8. Main Ducts: Adjust main ducts to within design CFM requirements and traverse for total CFM quantities.
 9. Branch Ducts: Adjust branch ducts to within design CFM requirements. Multi-diffuser branch ducts shall have at least one outlet or inlet volume damper completely open.
 10. Tolerances: Test and balance each diffuser, grille, and register to within 10% of design requirements.
 11. Identification: Identify the location and area of each grille, diffuser, register, and terminal coil. This information shall be recorded on air outlet data sheets.
 12. Description: Record the size, type, and manufacturer of each diffuser, grille, and register on air outlet data sheets.
 13. Minimizing Drafts: Adjust all diffusers, grilles, and registers to minimize drafts in all areas.

2.5 VERIFICATION OF DDC CONTROLS

- A. The balancing agency shall be assisted by the DDC Control Contractor in verifying the operation and calibration of all temperature control systems. The following tests shall be conducted:
 - 1. Verify that all control components are installed in accordance with project requirements and are functional, including all electrical interlocks, damper sequences, air and water reset, and ionization detectors.
 - 2. Verify that all controlling instruments are calibrated and set for design operating conditions.
 - 3. Verify the accuracy of the final settings by taking temperature readings. The readings shall be in a typical conditioned space for each separately controlled zone.

2.6 TEST AND BALANCE REPORT

- A. The Test and Balance Report shall be complete with logs, data, and records as required herein. All logs, data, and records shall be typed on white bond paper and bound. The report shall be certified accurate and complete by the balancing Agency's certified Test and Balance Engineer.
- B. Six (6) copies of the Test and Balance Report are required and shall be submitted to the Owner's Representative.
- C. The report shall contain the following general data in a format selected by the balancing agency.
 - 1. Project and Contract Number
 - 2. Project Title and Location
 - 3. Project Architect and Resident Engineer and Mechanical Engineer
 - 4. Test and Balance Agency and Engineer
 - 5. General Contractor
 - 6. Mechanical Subcontractor
 - 7. Dates Tests Were Performed
 - 8. Certification
- D. The Test and Balance Report shall be recorded on report forms conforming to the recommended forms in the AABC NATIONAL STANDARDS or NEBB STANDARDS. At a minimum, the report shall include:
- E. Preface: A general discussion of the system, any abnormalities and problems encountered.
- F. Instrumentation List: The list of instruments including type, model, manufacturer, serial number, and calibration dates.
- G. System Identification: In each report, the zones, supply, return, and exhaust openings, and traverse points shall be numbered and/or lettered to correspond to the numbers and letters used on the report data sheets. A single line drawing shall be prepared for each floor or system to cross reference information on the data sheets.

H. HVAC Equipment Test Report Forms: Record the following on each air handling equipment test form:

1. Manufacturer, model number, and serial number.
2. All design and manufacturer rated data.
3. Total actual CFM by traverse; see the AABC NATIONAL STANDARDS or NEBB STANDARDS.
4. Suction and discharge static pressure of each fan, as applicable.
5. Outside air and return air total CFM.
6. Actual operating current, voltage, and brake horsepower of each fan motor.
7. Final RPM of each fan.
8. Fan and motor sheave manufacturer, model, size, number of grooves, and center distance.
9. Belt size and quantity.
10. Static pressure controls final operating set points.

2.7 FINAL ACCEPTANCE

- A. At the time of final inspection, the balancing agency shall recheck, in the presence of the Owner's Representative, specific and random selections of data recorded in the certified Test and Balance Report.
- B. Points and areas for recheck shall be selected by the Owner's Representative.
- C. Measurements and test procedures shall be the same as the original test and balance.
- D. Selections for recheck, specific plus random, shall not normally exceed 15% of the total number tabulated in the report, except where special air systems require a complete recheck for safety reasons.
- E. If random tests demonstrate a measured flow deviation of 10% or more from that recorded in the certified Test and Balance Report, the report shall automatically be rejected. In the event the report is rejected, all systems shall be readjusted and tested, new data recorded, a new certified Test and Balance Report submitted, and a new inspection test made, all at no additional cost to the Owner.

END OF SECTION

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SECTION 23 09 23

DIRECT DIGITAL CONTROL SYSTEM

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

- A. Provide all work for the complete installation of automatic temperature controls.
1. Work in this Section shall include the following primary items:
 - a) Electronic and electric controls, includes sensors, switches, relays, control panels for instruments.
 - b) Local control panels.
 - c) Adjustment and validation of control system.
 - d) Instruction of Owner's representative on maintenance and operation of control equipment.
 - e) Electric diagrams showing interlocks between equipment furnished under the other sections and control furnished herein.
 - f) Direct digital control for systems as indicated on the drawings.
 - g) Wiring and Conduit: Low and line voltage for the control system under Division 23, Power Wiring under Division 26.

1.2 SYSTEM

- A. The DDC Control System shall be installed as a installed project and shall consist of all sensors, actuators, direct digital controllers, supervisory controller, electrical low voltage (24 VAC) and line voltage control wiring for a complete and operating installation as specified herein. The system shall be a standard product with the manufacturer who will guarantee ongoing parts availability and factory trained field support for five (5) years after system acceptance.

PART 2 PRODUCTS

2.1 GENERAL DESCRIPTION

- A. Individual Zone Controller
1. The zone controller shall modulate damper actuators to maintain space temperature.

PART 3 EXECUTION

3.1 GENERAL

- A. All system components and appurtenances shall be installed in accordance with the manufacturer's instructions and requirements. All necessary interconnections, services and adjustments required for a complete and operable system, shall be provided by this contractor.

3.2 INSTALLATION

A. GENERAL

1. Electric Wiring: This contractor is responsible for all low voltage control wiring installation and wire for a fully operational Control System as shown on the drawings. Perform all electrical installation in accordance with local and national electrical codes.
2. Install all electronic wiring, 24VDC or less, in No. 20 AWG as a minimum. Provide shields as required by equipment manufacturer.

3.3 EQUIPMENT INSTALLATION

- A. Space Thermostat and Sensor Locations: In general, locate thermostats and sensors for room control as shown on drawings at approximately 48 inches from floor. Coordinate thermostat locations with General Contractor and approval by Engineer.
- B. Local Control Panels: Mount all local control panels as indicated on the control drawings.

END OF SECTION

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September 25, 2015

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Fire Station No.22
Direct Digital Control System

SECTION 23 35 00

OVERHEAD VEHICLE EXHAUST REMOVAL SYSTEM

PART 1 GENERAL

1.1 GENERAL CONDITION

- A. The contractor shall provide all labor, materials and equipment necessary to working operation a complete system to remove exhaust gases and particulate of operating vehicles within the confines of the apparatus bay. All controls, blowers, ductwork and fittings for a complete project.
- B. All workman ship and materials shall be in accordance's with applicable codes regulation, i.e., SMACNA, BOCA, NEC, ASTM, CBC, CMC, NFPA and AMCA.
- C. The contractor shall install and guarantee all materials, equipment and workmanship for a period of 5 years from final acceptance of the complete project, against original defects and deterioration. Replacement will be at no cost to the owner.

1.2 SUBMITTALS AND OPERATION MAINTENANCE DATA

- A. Submittals shall be made in accordance with Section 01 33 00. All submittals shall be clearly marked or highlighted showing conformance to specifications and schedule. Provide shop drawings indicating all system components and dimensions.
- B. Operation and maintenance data shall be in accordance with Section 01 33 00 and shall include instructions for operation, changing and periodic cleaning.

PART 2 PRODUCTS

2.1 SYSTEM SUPPLIER

- A. The complete system shall be EVEC System manufactured by Plymovent (www.plymovent.com) or equal.

2.2 AIR MOVING DEVICES

- A. The fan shall be direct drive, single width airfoil blade. Fan housing shall be heavy duty steel with rust inhibiting plant. Fan construction shall be AMCA sparkresistant.
- B. Fan motor shall be type TEFC with permanently sealed bearings.
- C. Fan sound generation should not exceed 59 dBA @ 10ft from source.

2.3 CONTROL PANEL

- A. All components shall be UL listed. Panel assembly shall be built in accordance to UL 508 standard (CSA/NRTL/UL).
 - 1. Enclosure shall be NEMA 4X water and dust resistant.
 - 2. Motor starter shall be sized to 125% of required capacity.
 - 3. Overload relay shall be adjustable and sized to 125% capacity.

4. Timer shall be solid state fully adjustable from 6 to 600seconds.
5. Engine pressure switch shall be positive pressure from the vehicle exhaust.
6. Electrical terminal Block 600V.
7. Disconnect switch.
8. Auto/manual switch.
9. Indicator light (On).
10. Transformer.
11. Low frequency receiver/transmitter.

2.4 DUCTWORK SYSTEM ACCESSORIES

- A. Shall be spiral pipe sized to handle 8" of static pressure.
- B. Duct fittings shall be one even gauge number heavier than ductwork. All 45 & 90 degree fitting shall be 1.5 times the radius. All fitting shall be all welded or stamped.
- C. Ductwork velocities shall be 3000 to 3500 fpm with a minimum hose capture velocity of minimum 4400 fpm.

2.5 VEHICLE EXHAUST CAPTURE SYSTEM

- A. Scope of operation: For the Evec Systems REC system. The system is designed to capture and remove all particulate from entering the apparatus bay via the vehicle tailpipe. The system is activated by either a positive pressure switch that senses the vehicles exhaust and/or wireless transmitter before the vehicle is started.

2.6 DEVICES AND PARTS

- A. REC system consists of the following items.
 1. 14 gage galvanized steel formed sheet metal chambertrack.
 2. TELSPAR telescoping 2" 12 gage square tube with a 1 5/8" square channel.
 3. Bracing: 1/2" all thread rod with 1/2" nuts, flat washers and lock washers.
 4. 45 degree bracing brackets.
 5. Galvanized steel foot bracket.
 6. Hose retractor.
 7. Rollers exhaust trolley.
 8. Hose sling.
 9. Hose retractor.
 10. 12 -1/2 feet long silicone fiberglass two ply hose, with a 600 degree F temperature rating.
 11. EPDM rubber tailpipe adapter with two linear magnets.
 12. 70 D "Neoprene Rubber" lips.

PART 3 EXECUTION

3.1 INSTALLATION

- A. All steel components such as fan wall mounts will be galvanized. All fasteners or fittings to connect EVEC components to the building are to be supplied by the installer.
- B. All components shall be installed per manufacturer's installation instructions.

- C. No-loss exhaust stacks at fan discharge. Rain cap not permitted.
- D. Top of exhaust chamber shall be cleaned at the end of construction.

END OF SECTION

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SECTION 26 05 01

BASIC ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.1 SCOPE

- A. This section supplements all sections of this Division and shall apply to all phases of work hereinafter specified, shown on the drawings, or required to provide a complete installation of electrical systems for the Project. The Work required under this Division, is not limited to the Electrical Drawings. Refer to Site, Architectural, Structural, and Mechanical Drawings that may designate Work to be accomplished. The intent of the Specifications is to provide a complete electrical system that includes all documents that are a part of the Contract.
1. Work Included: Furnish all labor, material, services and skilled supervision necessary for the construction, erection, installation, connections, testing, and adjustment of all circuits and electrical equipment specified herein, or shown or noted on the Drawings, and its delivery to the Owner complete in all respects ready for use.
- B. Contract Drawings: The Contract Drawings are shown in part diagrammatic, intended to convey the Scope of Work indicating the intended general arrangement of equipment, conduit and outlets. Follow the contract drawings in laying out the work and verify spaces for the installation of the materials and equipment based on actual dimensions of equipment furnished. Where conflicts occur, the most stringent application shall apply wherever a question exists as to the exact intended location of outlets or equipment obtain instructions from the Architect before proceeding with the Work.
- C. Equipment or Fixtures: Equipment and fixtures shall be connected to provide circuit continuity in accordance with the Specifications whether or not each piece of conductor, conduit, or protective device is shown between such items of equipment or fixtures, and the point of circuit origin.
- D. Work Installed but Furnished under Other Sections: The Electrical Work includes the installation or connection of certain materials and equipment furnished under other sections. Verify installation details. Foundations for apparatus and equipment will be furnished under other sections unless otherwise noted or detailed.

1.2 GENERAL REQUIREMENTS

- A. Guarantee: Furnish a written guarantee for a period of one year from date of filing of notice of completion.
- B. Equipment Safety: All electrical materials and equipment shall be new and shall be listed by Underwriter's Laboratories and bear their label, or listed and certified by a nationally recognized testing authority where UL does not have an approval. Custom made equipment must have complete test data submitted by the manufacturer attesting to its safety.
- C. Codes and Regulations:
1. Design, manufacture, testing and method of installation of all apparatus and materials furnished under the requirements of these specifications shall conform to the latest publications or standard rules of the following:
 - a. Institute of Electrical and Electronic Engineers – IEEE
 - b. National Electrical Manufacturers' Association – NEMA
 - c. California Fire Code – CFC

- d. California Building Code – CBC
- e. Underwriters' Laboratories, Inc. – UL
- f. National Fire Protection Association – NFPA
- g. Federal Specifications - Fed. Spec.
- h. American Society for Testing and Materials – ASTM
- i. American National Standards Institute – ANSI
- j. American Standard Association – ASA
- k. California Electrical Code – CEC
- l. National Electrical Safety Code – NESC
- m. Insulated Power Cable Engineers Association – IPCEA
- n. Public Utilities Commission – PUC
- o. California Code of Regulations, Title 8, Subchapter 5
- p. California Code of Regulations, Title 24
- q. State & Municipal Codes in Force in the Specific Project Area
- r. Occupational Safety and Health Administration –OSHA

2. The term "Code", when used within the specifications, shall refer to the Publications, Standards, ordinances and codes, listed above. In the case where the codes have different levels of requirements the most stringent rules shall apply.

D. Seismic Design of Electrical Equipment:

1. All electrical prefabricated equipment is to be designed and constructed in such a manner that all portions, elements, sub-assemblies and/or parts of said equipment and the equipment as a whole, including their attachments, will resist a horizontal load equal to the operating weights of those parts multiplied times the following factors:

Type of Equipment	Horizontal CP	Vertical CP
Rigid and rigidly supported piping or equipment such as boilers, chillers, pumps, motors, transformers, unit substations and control panels.	0.50	0.33
Flexible and flexibly supported equipment such as air-handling units, piping and other equipment so supported that the fundamental period of vibration of the equipment and its supporting system is greater than 0.05 seconds. Communication equipment and emergency stand-by equipment	1.00	0.67

- 2. Load is to be applied at the center of gravity of the part and to be in any direction horizontally. Design stresses shall be in accordance with the specifications for design of the American Institute of Steel Construction. Anchorage, support and/or attachment of said prefabricated equipment to the structure should be in accordance with the details found in the plans and specifications.
- 3. It is the entire responsibility of the Contractor to verify the design of equipment so that the strength and anchorage of the internal components of the equipment exceeds the force level used to restrain and anchor the unit itself to the supporting structure.

E. Requirements of Regulatory Agencies:

1. Codes, Permits and Fees: Where the Contract Documents exceed minimum requirements, the Contract Documents take precedence. Where code conflicts occur, the most stringent shall apply unless variance is approved. Where provisions in the drawings and specifications differ in regard to code application, size, quality, quantity or type of equipment, Contractor shall include in the bid, costs for the most costly provision either denoted in the specifications or on the drawings. This provision shall apply as an amendment to the California Public Contracts Code.

- a. Comply with all requirements for permits, licenses, fees and Code. Permits, licenses, fees, inspections and arrangements required for the Work shall be obtained by the Contractor at his expense, unless otherwise specified.
 - b. Comply with the requirements of the applicable utility companies serving the Project. Make all arrangements with the utility companies for proper coordination of the Work.
 - 2. Substitutions: The materials, products, and equipment described in the Contract Documents establish a standard of required function, dimension, appearance, and quality. Architect may consider requests for substitutions of specified equipment, materials, or products in cases of product unavailability and then only when request are submitted in accordance with the provisions of the Contract Documents, Division 1, and are received by the Architect a minimum of 21 days prior to the date established for the receipt of the bid. No substitutions will be considered after the date of the receipt of the bid or contract award unless there is cause for a substitution which complies in every respect to the provisions of the Contract Documents, Division 1. Substitution requests shall be made in accordance with Public Contracts Code (AB2084) revisions as follows:
 - a. No substitutions are allowed after bid opening.
 - b. All substitutions must be requested 21 days prior to bid opening date.
 - c. Final addendum naming approved substitutions of materials/equipment must be issued 7 days prior to bid date.
- F. Record Drawings: Comply with Division 1. Keep up to date, monthly payments withheld if not updated.
- G. Shop Drawings and Submittals: Submittals on all material prior to installation.
- 1. Drawings shall be submitted, as required under Division 1.
 - 2. Submit complete schedule of submittals for review and acceptance no later than 30 days after signing contract.
 - 3. Shop drawings shall be submitted on, but not limited to, the following:
 - a. Equipment Wiring Connections
 - b. Low-Voltage Electrical Power Conductors and Cables
 - c. Grounding and Bonding for Electrical Systems
 - d. Hangers and Supports for Electrical Systems
 - e. Raceway and Boxes for Electrical Systems
 - f. Lighting Control Devices
 - g. Network Lighting Controls
 - h. Switchboards
 - i. Panelboards
 - j. Electrical Cabinets and Enclosures
 - k. Wiring Devices
 - l. Fuses
 - m. Enclosed Switches
 - n. Enclosed Transfer Switches
 - o. Engine Generators
 - p. Interior Lighting
 - q. Fire Detection and Alarm
 - r. Electrical Underground Ducts
 - s. Electrical Utility Services
 - t. Short circuit & coordination study
 - u. Site Grounding
- H. Trenching and Backfilling: All trenching and backfilling for electrical work shall be the responsibility of the contractor and shall be done in accordance with Division 2, 31 and 33 of this specification. The Contractor shall examine the drawings of all other sections to determine locations of all existing underground lines. The Contractor shall use extreme caution when

working in the vicinity of these lines and shall be responsible for the proper and approved repair of any damage caused by his work.

I. Cutting and Patching:

1. Obtain written permission from the Architect before core drilling or cutting any structural members. Exact method and location of conduit penetrations and/or openings in concrete walls, floors, or ceilings shall be as approved by the Architect.
2. All core drilling, cutting and patching for this work shall be performed under this Section of the specifications. Use craftsmen skilled in their respective sections for cutting, fitting, repairing, patching of plaster and finishing of materials including carpentry work, metal work or concrete work required for this Work. Do not weaken walls, partitions or floor with cutting. Holes required to be cut in floors must be drilled without excessive breaking out around the holes. Patching and/or refinishing shall be determined by the Architect.
3. Use care in piercing waterproofing. After the part piercing the waterproofing has been set in place, seal openings and make absolutely watertight.
4. Seal all openings to meet the fire rating of the particular wall floor or ceiling. Conform to Division 7.
5. Conform to Division 1.

1.3 JOB CONDITIONS

A. Existing Conditions:

1. The contractor shall visit the site and verify existing conditions. Where existing conditions differ from the drawings, adjustment shall be made and allowances included for all necessary equipment to complete all parts of the drawings and specifications.
2. Electrical circuits affecting work shall be de-energized while working on or near them.
3. Arrange the work so that electrical power is available to all electrical equipment within existing facility at all times. Schedule all interruptions at the convenience of the Owner, including exact time and duration. Provide temporary power during all periods of interruption, which are deemed excessive by the Owner. Costs of all premium time (overtime) resulting from the scheduled power interruptions and all costs for providing temporary power shall be included in the cost of the Work.

B. Protection:

1. Protection of apparatus, materials and equipment. Take such precautions as necessary to properly protect all apparatus, fixtures, appliances, material, equipment and installations from damage of any kind. The Engineer may reject any particular piece or pieces of material, apparatus or equipment scratched, dented or otherwise damaged.
2. Seal equipment or components exposed to the weather and make watertight and insect proof. Protect equipment outlets and conduit openings with temporary plugs or caps at all times that work is not in progress.

C. Sequencing and Scheduling:

1. Work lines and established heights shall be in strict accordance with architectural drawings and specifications insofar as these drawings and specifications extend. Verify all dimensions shown and establish all elevations and detailed dimensions not shown.
2. Lay out and coordinate all work well enough in advance to avoid conflicts or interferences with other work in progress so that in case of interference the electrical layout may be altered to suit the conditions, prior to the installation of any work and without additional cost to the Owner. Conflicts arising from lack of coordination shall be this Contractor's responsibility. Maintain all code-required clearances about electrical equipment. Unless specifically noted otherwise, establish the exact location of electrical equipment based on the actual dimensions of equipment furnished.

1.4 DRAWINGS

- A. Electrical layouts are generally diagrammatic and although size and location of equipment is for reference only, contractor shall make use of all data in contract documents and verify this information at building site.
- B. Locations of items on the drawings may be distorted for purposes of clearness and legibility. Actual locations of architectural and mechanical items are shown on architectural and mechanical drawings.
- C. Contractor shall adjust locations of light fixtures in mechanical rooms to compensate for changes in duct routing, to provide reasonably uniform lighting in work areas.
- D. Outlets shall be located in accordance with architectural design, and specific locations may be determined by Owner's Representative at jobsite prior to installation.
- E. Outlets located on architectural plans by dimension shall be held. Additional outlets may be shown on electrical plans and shall be installed as close as practical to the location shown.
- F. Manufacturer's drawings and instructions shall be followed in all cases where the makers of devices and equipment furnish directions, where details are not shown on the drawings, or where described in the specifications.
- G. Work installed in a manner contrary to that shown in the contract documents shall be removed and reinstalled when so directed by the architect. Discrepancies and questionable points shall be immediately reported to the architect for clarification.
- H. The Owner and architect reserve the right to make reasonable changes in outlet locations in each area prior to roughing.

1.5 HOUSEKEEPING PADS AND FOUNDATION

- A. Concrete work required for housekeeping pads and foundations will be provided by general construction work.
- B. Furnish required dimensional drawings and specify locations. Minimum height of housekeeping pads shall be as shown in the drawings and shall extend out 6 inches from the footprint of the equipment.
- C. Furnish anchor bolts and sleeves, and verify accuracy of installation.
- D. Provide for:
 - 1. Emergency generators
 - 2. Switchboards, and floor mounted ATS.
 - 3. Distribution panels.
 - 4. Outdoor light fixture
 - 5. Other items as required.

1.6 WORK IN COOPERATION WITH OTHER SECTIONS

- A. Examine the drawings and specifications and determine the work to be performed by the electrical, mechanical and other sections. Provide the type and amount of electrical materials and equipment necessary to place this work in proper operation, completely wired, tested and ready for use. This shall include all conduit, wire, motor starters, disconnects, relays, time clocks and other devices for the required operation sequence of all electrical, mechanical and

other systems or equipment. Where a conflict occurs on drawings, the most stringent shall apply.

- B. Plan all work so that it proceeds with a minimum of interference with other sections. Inform all parties concerned of openings required for equipment or conduit required in the building construction for electrical work and provide all special frames, sleeves and anchor bolts as required. Coordinate the electrical work with the mechanical installation. Promptly report to the Architect any delay or difficulties encountered in the installation of this work which might prevent prompt and proper installation, or make it unsuitable to connect with or receive the work of other sections. Failure to so report shall constitute an acceptance of the work of other sections as being fit and proper for the execution of this work.

1.7 TESTING AND ADJUSTMENT

- A. Upon completion of all Electrical Work, the contractor shall provide all testing as follows:
 1. Operational Test: Test all circuit breakers, receptacles, motors and all other electrical and communication equipment. Replace all faulty devices and equipment discovered during testing with new devices and equipment at no additional cost, and that part of the system (or devices or equipment) shall then be retested.
 2. Secondary Grounding Resistance: Perform ground continuity test between main ground system and equipment frame, system neutral and/or derived neutral point.
 3. All test procedure shall be performed by an independent testing firm.

1.8 MAINTENANCE, SERVICING AND INSTRUCTION MANUALS, AND WIRING DIAGRAMS

- A. Prior to substantial completion, the contractor shall submit 5 copies of operating and maintenance and servicing instructions, as well as an equal number of copies of complete wiring diagrams all neatly bound in hard cover 3-ring binders with table of contents and tabs for the following items or equipment: (See Division 1):
 1. Equipment Wiring Connections
 2. Lighting Control Devices
 3. Network Lighting Controls
 4. Switchboards
 5. Panelboards
 6. Wiring Devices
 7. Enclosed Transfer Switches
 8. Engine Generators
 9. Interior Lighting
 10. Fire Detection and Alarm
- B. All wiring diagrams shall specifically cover the installed system indicating zones, wiring, and components added to the system. Typical drawings will not be accepted.

1.9 FINAL INSPECTION AND ACCEPTANCE

After all requirements of the specifications and/or the drawings have been fully completed representatives of the Owner will inspect the Work. The Contractor shall provide competent personnel to demonstrate the operation of any item of system, to the full satisfaction of each representative. The Contractor shall provide 4 hours of minimum scheduled operation and maintenance training for school maintenance staff on each system indicated in 1.6A above.

- A. Final acceptance of the work will be made by the Owner after receipt of approval and recommendation of acceptance from each representative.
- B. The Contractor shall furnish Record Drawings before final payment of retention.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 EXECUTION

- A. Layout and installation of electrical work shall be coordinated with the overall construction schedule of work schedules of various trades to prevent delay in completion of the project.
- B. Dimensions and information regarding accurate locations of equipment and structural limitations and finish shall be coordinated and verified with other divisions of work. Be prepared to promptly furnish dimensions and information regarding electrical work to other trades and cooperate with them to secure harmony and the best progress of the project.
- C. The drawings do not show off-sets, bends and special fittings or junction or pull boxes necessary to meet job conditions. These items shall be provided as required

END OF SECTION

SECTION 26 05 03

EQUIPMENT WIRING CONNECTIONS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes electrical connections to equipment.
- B. Related Sections:
 - 1. Division 26 - Low-Voltage Electrical Power Conductors and Cables.
 - 2. Division 26 - Raceway and Boxes for Electrical Systems.

1.2 REFERENCES

- A. National Electrical Manufacturers Association:
 - 1. NEMA WD 1 - General Requirements for Wiring Devices.
 - 2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.
 - 3. ANSI/NFPA 70 – National Electrical Code / California Electrical Code

1.3 SUBMITTALS

- A. Division 01 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit wiring device manufacturer's catalog information showing dimensions, configurations, and construction.
- C. Manufacturer's installation instructions. Indicate application conditions and limitations of use stipulated by product testing agency specified under regulatory requirements. Include instructions for storage, handling, protection, examination, preparation, installation and starting of product.
- D. Acceptance or no exceptions taken by the engineer on any substitution proposed by the contractor shall not be construed as relieving the contractor from compliance with the project's specifications and performance requirements nor departure there from. The contractor remains responsible for details and accuracy for confirming and correlating quantities and dimensions and for the selection of fabrication processes, techniques and assembly, coordination of his work with that of all other trades and making any needed modifications consequent to the substitution at his own cost and for performing the work in a safe manner.

1.4 CLOSEOUT SUBMITTALS

- A. Division 01 - Execution and Closeout Requirements: Submittal procedures.
- B. Project Record Documents: Record actual locations, sizes, and configurations of equipment connections.

1.5 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.

- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

1.6 COORDINATION

- A. Division 01 - Administrative Requirements: Coordination and project conditions.
- B. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
- C. Determine connection locations and requirements.
- D. Sequence rough-in of electrical connections to coordinate with installation of equipment.
- E. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 PRODUCTS

2.1 CORD AND PLUGS

- A. Straight blade attachment plug: NEMA WD1
- B. Locking blade attachment plug: NEMA WD3.
- C. Attachment Plug Construction: Conform to NEMA WD 1.
- D. Configuration: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
- E. Cord Construction: ANSI/NFPA 70, Type SO multi-conductor flexible cord with identified equipment-grounding conductor, suitable for use in damp locations.
- F. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Division 01 - Administrative Requirements: Coordination and project conditions.
- B. Verify equipment is ready for electrical connection, for wiring, and to be energized.

3.2 INSTALLATION

- A. Make electrical connections in accordance with equipment manufacturer's instruction.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

- D. Install receptacle outlet to accommodate connection with attachment plug.
- E. Install cord and cap for field-supplied attachment plug.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.
- J. Coolers and Freezers: Cut and seal conduit openings in freezer and cooler walls, floor, and ceilings.

3.3 ADJUSTING

- A. Division 01 - Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Cooperate with utilization equipment installers and field service personnel during checkout and starting of equipment to allow testing and balancing and other startup operations. Provide personnel to operate electrical system and checkout wiring connection components and configurations.

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

B. Related Requirements:

1. Section 271500 "Communications Horizontal Cabling" for cabling used for voice and data circuits.

1.3 DEFINITIONS

- A. VFC: Variable frequency controller.

1.4 ACTION SUBMITTALS

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

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- 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. Alcan Products Corporation; Alcan Cable Division.
 2. Alpha Wire.
 3. Belden Inc.
 4. Encore Wire Corporation.
 5. General Cable Technologies Corporation.
 6. Southwire Incorporated.
 7. Or equal.
- B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.
- C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN-2-THWN-2.
- D. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for metal-clad cable, Type MC with ground wire.

2.2 CONNECTORS AND SPLICES

- 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. AFC Cable Systems, Inc.
 2. Gardner Bender.
 3. Hubbell Power Systems, Inc.
 4. Ideal Industries, Inc.
 5. Ilscq; a branch of Bardes Corporation.
 6. NSi Industries LLC.
 7. O-Z/Gedney; a brand of the EGS Electrical Group.
 8. 3M; Electrical Markets Division.
 9. Tyco Electronics.
 10. Or equal.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders and Branch Circuits: Copper. Stranded for No. 12 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN-2-THWN-2, single conductors in raceway.
- B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-2-THWN-2, single conductors in raceway.
- C. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.
- D. Exposed Branch Circuits, Including in Crawlspace: Type THHN-2-THWN-2, single conductors in raceway.
- E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-2-THWN-2, single conductors in raceway.
- F. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.
- G. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches (300 mm) of slack.

3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

3.6 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07.

3.7 FIELD QUALITY CONTROL

- A. Test and Inspection Reports: Prepare a written report to record the following:
 - 1. Procedures used.
 - 2. Results that comply with requirements.
 - 3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- B. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes grounding and bonding systems and equipment.
- B. Section includes grounding and bonding systems and equipment, plus the following special applications:
 - 1. Underground distribution grounding.
 - 2. Foundation steel electrodes.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. As-Built Data: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
 - 1. Test wells.
 - 2. Ground rods.
 - 3. Grounding arrangements and connections for separately derived systems.
- B. Qualification Data: For testing agency and testing agency's field supervisor.
- C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in Division 01, include the following:
 - a. Instructions for periodic testing and inspection of grounding features at test wells based on NETA MTS NFPA 70B.
 - 1) Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
 - 2) Include recommended testing intervals.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or anNRTL.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-sitetesting.
- 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. Comply with UL 467 for grounding and bonding materials and equipment.

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. Burndy, Part of Hubbell Electrical Systems.
 - 2. ERICO International Corporation.
 - 3. Fushi Copperweld Inc.
 - 4. ILSCO.
 - 5. O-Z/Gedney, A Brand of the EGS Electrical Group.
 - 6. Siemens Power Transmission & Distribution, Inc.
 - 7. Or equal.

2.2 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

2.3 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
 - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
 - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
 - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
- C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 2 inches (6.3 by 50 mm) in cross section, with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.4 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.5 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet (19 mm by 3m).

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

- B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum.
 - 1. Bury at least 24 inches (600 mm) below grade.
- C. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - 1. Install bus horizontally, on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.
- D. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

- A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 GROUNDING SEPARATELY DERIVED SYSTEMS

- A. Generator: Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

3.4 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.
- B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches (100 mm) will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches (50 mm) above to 6 inches (150 mm) below concrete. Seal floor opening with waterproof, nonshrink grout.
- C. Pad-Mounted Transformers and Switches: Install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inches (150 mm) from the foundation.

3.5 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.

- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
1. Feeders and branch circuits.
 2. Lighting circuits.
 3. Receptacle circuits.
 4. Single-phase motor and appliance branch circuits.
 5. Three-phase motor and appliance branch circuits.
 6. Flexible raceway runs.
 7. Armored and metal-clad cable runs.
- C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- D. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.6 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 6 inches (150 mm) below finished floor or final grade unless otherwise indicated.
1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
 2. For grounding electrode system, install at least two rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Section 260543 "Underground Ducts and Raceways for Electrical Systems," and shall be at least 12 inches (300 mm) deep, with cover.
1. Test Wells: Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.
- D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

E. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

F. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

G. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart.

H. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; use a minimum of 20 feet (6 m) of bare copper conductor not smaller than No. 4 AWG.

1. If concrete foundation is less than 20 feet (6 m) long, coil excess conductor within base of foundation.
2. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.

4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- C. Grounding system will be considered defective if it does not pass tests and inspections.
 - D. Prepare test and inspection reports.
 - E. Report measured ground resistances that exceed the following values:
 1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
 - F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect and Resident Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION

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SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.5 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel slotted support systems.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:

1. Trapeze hangers. Include Product Data for components.
2. Steel slotted channel systems. Include Product Data for components.
3. Equipment supports.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.7 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with NFPA 70.

1.8 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together with concrete Specifications.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07.

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:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.
 - c. ERICO International Corporation.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.
 - f. Unistrut, Atkore International.
 - g. Wesanco, Inc.
 - h. Or equal.
 2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 3. 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. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Hilti, Inc.
 - 2) ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.
 - 5) Or equal.
 - 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Cooper B-Line, Inc.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti, Inc.
 - 4) ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 - 6) Or equal.
 - 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.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 05 for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) 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.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT may be supported by openings through structure members, as permitted in NFPA70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.

4. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
5. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
6. To Light Steel: Sheet metal screws.

- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 05 for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 033000 "Cast-in-Place Concrete."
- C. Anchor equipment to concrete base.
 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 26 05 33

RACEWAYS AND BOXES 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. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Boxes, enclosures, and cabinets.
4. Handholes and boxes for exterior underground cabling.

B. Related Requirements:

1. Section 260543 "Underground Ducts and Raceways for Electrical Systems" for exterior duct banks, manholes, and underground utility construction.
2. Section 270528 "Pathways for Communications Systems" for conduits, wireways, surface pathways, inner duct, boxes, faceplate adapters, enclosures, cabinets, and handholes serving communications systems.

1.3 DEFINITIONS

- A. GRC: Galvanized rigid steel conduit.
- B. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. LEED Submittals:
 1. Product Data for Credit IEQ 4.1: For solvent cements and adhesive primers, documentation including printed statement of VOC content.
 2. Laboratory Test Reports for Credit IEQ 4: For solvent cements and adhesive primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- C. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

- B. Qualification Data: For professional engineer.

- C. Seismic Qualification Certificates: For enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
4. Detailed description of conduit support devices and interconnections on which the certification is based and their installation requirements.

- D. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

- 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. Allied Tube & Conduit.
2. Thomas & Betts Corporation.
3. Western Tube and Conduit Corporation.
4. Wheatland Tube Company.
5. Or equal.

- B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- C. GRC: Comply with ANSI C80.1 and UL 6.

- D. IMC: Comply with ANSI C80.6 and UL 1242.

- E. EMT: Comply with ANSI C80.3 and UL 797.

- F. FMC: Comply with UL 1; aluminum.

- G. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

- H. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL514B.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
 - 2. Fittings for EMT:
 - a. Material: die cast.
 - b. Type: compression.
 - 3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
 - 4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.
- I. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

- 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. CANTEX Inc.
 - 2. Condux International, Inc.
 - 3. Lamson & Sessions; Carlon Electrical Products.
 - 4. RACO; Hubbell.
 - 5. Thomas & Betts Corporation.
- B. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. ENT: Comply with NEMA TC 13 and UL 1653.
- D. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- E. LFNC: Comply with UL 1660.
- F. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
- G. Fittings for LFNC: Comply with UL 514B.
- H. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- I. Solvent cements and adhesive primers 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."

2.3 BOXES, ENCLOSURES, AND CABINETS

- 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. Hoffman.
 2. Hubbell Incorporated.
 3. Milbank Manufacturing Co.
 4. RACO; Hubbell.
 5. Spring City Electrical Manufacturing Company.
 6. Thomas & Betts Corporation.
 7. Or equal
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- E. Metal Floor Boxes:
1. Material: Cast metal.
 2. Type: Fully adjustable.
 3. Shape: Rectangular.
 4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.
- G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- H. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.
- I. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- J. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep).
- K. Gangable boxes are prohibited.
- L. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.
1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

M. Cabinets:

1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.

2.4 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. General Requirements for Handholes and Boxes:

1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.

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. Armorcast Products Company.
 - b. Carson Industries LLC.
 - c. Oldcastle Precast, Inc.
 - d. Quazite: Hubbell Power System, Inc.
 - e. Or equal.
2. Standard: Comply with SCTE 77.
3. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
6. Cover Legend: Molded lettering, "ELECTRIC" "COMM".
7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
8. Handholes 12 Inches Wide by 24 Inches Long (300 mm Wide by 600 mm Long) and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed Conduit: GRC.
 - 2. Concealed Conduit, Aboveground: EMT.
 - 3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
 - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 - 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed, Not Subject to Physical Damage: EMT.
 - 2. Exposed, Not Subject to Severe Physical Damage: EMT.
 - 3. Exposed and Subject to Severe Physical Damage: GRC.

 - 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 - 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 - 6. Damp or Wet Locations: GRC.
 - 7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 3R in damp or wet locations.

- C. Minimum Raceway Size: 3/4-inch (21-mm) trade size.

- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB2.10.
 - 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 - 3. EMT: Use compression, cast-metal fittings. Comply with NEMA FB2.10.
 - 4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

- E. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.

- F. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

- G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- E. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- H. Support conduit within 12 inches (300 mm) of enclosures to which attached.
- I. Stub-ups to Above Recessed Ceilings:
 - 1. Use EMT, IMC, or RMC for raceways.
 - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- K. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- L. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- N. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- O. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- P. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

- Q. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- R. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.
- S. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where an underground service raceway enters a building or structure.
 - 3. Where otherwise required by NFPA 70.
- T. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- U. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches (1830 mm) of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
 - 1. Use LFMC in damp or wet locations subject to severe physical damage.
 - 2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
- V. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to top of box unless otherwise indicated.
- W. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.
- X. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- Y. Locate boxes so that cover or plate will not span different building finishes.
- Z. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- AA. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- BB. Set metal floor boxes level and flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 for pipe less than 6 inches (150 mm) in nominal diameter.
2. Install backfill as specified in Division 31.
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31.
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete for a minimum of 12 inches (300 mm) on each side of the coupling.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
6. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch (12.5-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch (25 mm) above finished grade.
- D. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables but short enough to preserve adequate working clearances in enclosure.
- E. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Division 07.

3.6 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 26 0543

UNDERGROUND DUCTS AND RACEWAYS 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. Direct-buried conduit, ducts, and duct accessories.
 - 2. Handholes and boxes.

1.3 DEFINITIONS

- A. Trafficways: Locations where vehicular or pedestrian traffic is a normal course of events.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include duct-bank materials, including separators and miscellaneous components.
 - 2. Include ducts and conduits and their accessories, including elbows, end bells, bends, fittings, and solvent cement.
 - 3. Include accessories for manholes, handholes, boxes.
 - 4. Include warning tape.
- B. Shop Drawings:
 - 1. Factory-Fabricated Handholes and Boxes Other Than Precast Concrete:
 - a. Include dimensioned plans, sections, and elevations, and fabrication and installation details.
 - b. Include duct entry provisions, including locations and duct sizes.
 - c. Include cover design.
 - d. Include grounding details.
 - e. Include dimensioned locations of cable rack inserts, and pulling-in and lifting irons.

1.5 INFORMATIONAL SUBMITTALS

- A. Duct-Bank Coordination Drawings: Show duct profiles and coordination with other utilities and underground structures.
 - 1. Include plans and sections, drawn to scale, and show bends and locations of expansion fittings.
 - 2. Drawings shall be signed and sealed by a qualified professional engineer.
- B. Product Certificates: For concrete and steel used in precast concrete handholes, as required by ASTM C 858.
- C. Qualification Data: For professional engineer and testing agency responsible for testing nonconcrete handholes and boxes.
- D. Source quality-control reports.
- E. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

1.7 FIELD CONDITIONS

- A. Ground Water: Assume ground-water level is at grade level unless a lower water table is noted on Drawings.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR DUCTS AND RACEWAYS

- A. Comply with ANSI C2.

2.2 CONDUIT

- A. Rigid Steel Conduit: Galvanized. Comply with ANSI C80.1.
- B. RNC: NEMA TC 2, Type EPC-40-PVC, UL 651, with matching fittings by same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.

2.3 NONMETALLIC DUCTS AND DUCT ACCESSORIES

- 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. CANTEX INC.
 2. Condux International, Inc.
 3. Electri-Flex Company.
 4. Or equal.
- B. Underground Plastic Utilities Duct: NEMA TC 2, UL 651, ASTM F 512, Type EPC-40, with matching fittings complying with NEMA TC 3 by same manufacturer as the duct.
- C. Solvents and Adhesives: As recommended by conduit manufacturer.
- D. Duct Accessories:
1. Duct Separators: Factory-fabricated rigid PVC interlocking spacers, sized for type and size of ducts with which used, and selected to provide minimum duct spacing indicated while supporting ducts during concreting or backfilling.
 2. Warning Tape: Underground-line warning tape specified in Section 260553 "Identification for Electrical Systems."

2.4 PRECAST CONCRETE HANDHOLES AND BOXES

- 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. Christy Concrete Products.
 2. Oldcastle Precast, Inc.
 3. Utility Concrete Products, LLC.
 4. Utility Vault Co.
 5. Wausau Tile Inc.
 6. Or equal.
- B. Comply with ASTM C 858 for design and manufacturing processes.

2.5 SOURCE QUALITY CONTROL

- A. Test and inspect precast concrete utility structures according to ASTM C 1037.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordinate layout and installation of ducts, manholes, handholes, and boxes with final arrangement of other utilities, site grading, and surface features as determined in the field. Notify Architect and Resident Engineer if there is a conflict between areas of excavation and existing structures or archaeological sites to remain.

- B. Coordinate elevations of ducts and duct-bank entrances into manholes, handholes, and boxes 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 as required to suit field conditions and to ensure that duct runs drain to manholes and handholes, and as approved by Architect and Resident Engineer.
- C. Clear and grub vegetation to be removed, and protect vegetation to remain according to Division 31. Remove and stockpile topsoil for reapplication according to Division 31.

3.2 UNDERGROUND DUCT APPLICATION

- A. Ducts for Electrical Feeders 600 V and Less: RNC, NEMA Type EPC-40-PVC, in direct-buried duct bank unless otherwise indicated.
- B. Ducts for Electrical Branch Circuits: RNC, NEMA Type EPC-40-PVC, in direct-buried duct bank unless otherwise indicated.

3.3 UNDERGROUND ENCLOSURE APPLICATION

- A. Handholes and Boxes for 600 V and Less:
 1. Units in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Precast concrete, AASHTO HB 17, H-20 structural load rating.
 2. Units in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: Precast concrete, AASHTO HB 17, H-10 structural load rating.
 3. Cover design load shall not exceed the design load of the handhole or box.

3.4 EARTHWORK

- A. Excavation and Backfill: Comply with Division 31, but do not use heavy-duty, hydraulic-operated, compaction equipment.
- B. Restore surface features at areas disturbed by excavation, and re-establish original grades unless otherwise indicated. Replace removed sod immediately after backfilling is completed.
- C. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching.
- D. Cut and patch existing pavement in the path of underground ducts and utility structures according Division 01.

3.5 DUCT INSTALLATION

- A. Install ducts according to NEMA TCB 2.
- B. Slope: Pitch ducts a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope ducts from a high point in runs between two manholes, to drain in both directions.

- C. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 48 inches (1200 mm), both horizontally and vertically, at other locations unless otherwise indicated.
- D. Joints: Use solvent-cemented joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in same plane.
- E. Building Wall Penetrations: Make a transition from underground duct to rigid steel conduit at least 10 feet (3 m) outside the building wall, without reducing duct line slope away from the building, and without forming a trap in the line. Use fittings manufactured for duct-to-conduit transition. Install conduit penetrations of building walls as specified in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."
- F. Sealing: Provide temporary closure at terminations of ducts that have cables pulled. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least 15-psig (1.03-MPa) hydrostatic pressure.
- G. Pulling Cord: Install 100-lbf- (445-N-) test nylon cord in empty ducts.
- H. Direct-Buried Duct Banks:
 - 1. Excavate trench bottom to provide firm and uniform support for duct bank. Comply with requirements in Division 31 for preparation of trench bottoms for pipes less than 6 inches (150 mm) in nominal diameter.
 - 2. Support ducts on duct separators coordinated with duct size, duct spacing, and outdoor temperature.
 - 3. Space separators close enough to prevent sagging and deforming of ducts, with not less than four spacers per 20 feet (6 m) of duct. Secure separators to earth and to ducts to prevent displacement during backfill and yet permit linear duct movement due to expansion and contraction as temperature changes. Stagger spacers approximately 6 inches (150 mm) between tiers.
 - 4. Depth: Install top of duct bank at least 36 inches (900 mm) below finished grade unless otherwise indicated.
 - 5. Install ducts with a minimum of 3 inches (75 mm) between ducts for like services and 6 inches (150 mm) between power and signal ducts.
 - 6. Elbows: Install manufactured duct elbows for stub-ups at poles and equipment, at building entrances through floor, and at changes of direction in duct run unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
 - 7. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment, at building entrances through floor, and at changes of direction in duct run.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete.
 - b. For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

8. After installing first tier of ducts, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand place backfill to 4 inches (100 mm) over ducts and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction. Comply with requirements in Division 31 for installation of backfill materials.

- a. Place minimum 3 inches (75 mm) of sand as a bed for duct bank. Place sand to a minimum of 6 inches (150 mm) above top level of duct bank.

- I. Warning Tape: Bury warning tape approximately 12 inches (300 mm) above all concrete-encased ducts and duct banks. Align tape parallel to and within 3 inches (75 mm) of centerline of duct bank. Provide an additional warning tape for each 12-inch (300-mm) increment of duct-bank width over a nominal 18 inches (450 mm). Space additional tapes 12 inches (300 mm) apart, horizontally.

3.6 INSTALLATION OF CONCRETE MANHOLES, HANDHOLES, AND BOXES

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, graded from 1-inch (25-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.

B. Elevations:

1. Handhole Covers: In paved areas and trafficways, set surface flush with finished grade. Set covers of other handholes 1 inch (25 mm) above finished grade.
2. Where indicated, cast handhole cover frame integrally with handhole structure.

3.7 GROUNDING

- A. Ground underground ducts and utility structures according to Section 260526 "Grounding and Bonding for Electrical Systems."

3.8 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:

1. Demonstrate capability and compliance with requirements on completion of installation of underground ducts and utility structures.
2. Pull solid aluminum or wood test mandrel through duct to prove joint integrity and adequate bend radii, and test for out-of-round duct. Provide a minimum 6-inch-(150-mm-) long mandrel equal to 80 percent fill of duct. If obstructions are indicated, remove obstructions and retest.

3. Test manhole and handhole grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in Section 260526 "Grounding and Bonding for Electrical Systems."

B. Correct deficiencies and retest as specified above to demonstrate compliance.

3.9 CLEANING

A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.

B. Clean internal surfaces of manholes, including sump. Remove foreign material.

END OF SECTION

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SECTION 26 05 53

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. Identification for raceways.
 - 2. Identification for conductors.
 - 3. Underground-line warning tape.
 - 4. Warning labels and signs.
 - 5. Equipment identification labels.
 - 6. Miscellaneous identification products.

1.3 ACTION SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- 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. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER AND CONTROL RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage.
- C. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

2.2 CONDUCTOR IDENTIFICATION MATERIALS

- A. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil- (0.08-mm-) thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the conductor diameter such that the clear shield overlaps the entire printed legend.

2.3 UNDERGROUND-LINE WARNING TAPE

- A. Tape:
 - 1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
 - 2. Printing on tape shall be permanent and shall not be damaged by burial operations.
 - 3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
- B. Color and Printing:
 - 1. Comply with ANSI Z535.1 through ANSI Z535.5.
 - 2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE,.
 - 3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE,.

C. Tag: Type ID:

1. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
2. Overall Thickness: 5 mils (0.125 mm).
3. Foil Core Thickness: 0.35 mil (0.00889mm).
4. Weight: 28 lb/1000 sq. ft. (13.7 kg/100 sq. m).
5. 3-Inch (75-mm) Tensile According to ASTM D 882: 70 lbf (311.3 N), and 4600 psi (31.7 MPa).

2.4 EQUIPMENT IDENTIFICATION LABELS

- A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10mm).

2.5 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. 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 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finishwork.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. Attach plastic raceway and cable labels that are not self-adhesive type with clear vinyl tape with adhesive appropriate to the location and substrate.
- G. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands 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.
- H. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.

- I. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line 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 or concrete envelope exceeds 16 inches (400 mm) overall.

3.2 IDENTIFICATION SCHEDULE

- A. Accessible Raceways and Cables within Buildings: Identify the inside and outside covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:

1. Emergency Power.
2. Power.
3. UPS.

- B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase Identification, 600 V or Less: Use colors listed below for ungrounded feeder and branch-circuit conductors.
 - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.

- C. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive, self-laminating polyester labels with the conductor or cable designation, origin, and destination.

- D. Control-Circuit Conductor Termination Identification: For identification at terminations provide heat-shrink preprinted tubes with the conductor designation.

- E. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.

1. Limit use of underground-line warning tape to direct-buried cables.
2. Install underground-line warning tape for both direct-buried cables and cables in raceway.

- F. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

- G. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.

1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.

4. 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.

- H. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 1. Labeling Instructions:
 - a. Indoor Equipment: Engraved, laminated acrylic or melamine label. 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.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

 2. Equipment to Be Labeled:
 - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be engraved, laminated acrylic or melamine label.
 - b. Enclosures and electrical cabinets.
 - c. Switchboards.
 - d. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
 - e. Emergency system boxes and enclosures.
 - f. Enclosed switches.
 - g. Enclosed circuit breakers.
 - h. Enclosed controllers.
 - i. Power transfer equipment.
 - j. Contactors.

END OF SECTION

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SECTION 26 09 23

LIGHTING CONTROL DEVICES

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. Time switches.
2. Photoelectric switches.
3. Indoor occupancy sensors.
4. Lighting contactors.

B. Related Requirements:

1. Section 262726 "Wiring Devices" for wall-box dimmers, wall-switch occupancy sensors, and manual light switches.

1.3 ACTION SUBMITTALS

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

- B. Shop Drawings: Show installation details for occupancy and light-level sensors.

1. Interconnection diagrams showing field-installed wiring.
2. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of lighting control device to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 TIME SWITCHES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cooper Industries, Inc.
2. Intermatic, Inc.
3. Leviton Manufacturing Co., Inc.
4. NSi Industries LLC; TORK Products.
5. Or equal

B. Electronic Time Switches: Solid state, programmable, with alphanumeric display; complying with UL 917.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Contact Configuration: SPST.
3. Contact Rating: 30-A inductive or resistive, 240-V ac.
4. Programs: Eight on-off set points on a 24-hour schedule and an annual holidayschedule that overrides the weekly operation on holidays.
5. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program on selected channels.
6. Astronomic Time: All channels.
7. Automatic daylight savings time changeover.
8. Battery Backup: Not less than seven days reserve, to maintain schedules and time clock.

2.2 OUTDOOR PHOTOELECTRIC SWITCHES

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. Cooper Industries, Inc.
2. Intermatic, Inc.
3. NSi Industries LLC; TORK Products.
4. Tyco Electronics; ALR Brand.
5. Or equal.

B. Description: Solid state, with SPST dry contacts rated for 1800-VA tungsten or 1000-VA inductive, to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Light-Level Monitoring Range: 1.5 to 10 fc (16.14 to 108 lux), with an adjustment for turn-on and turn-off levels within that range, and a directional lens in front of the photocell to prevent fixed light sources from causing turn-off.
3. Time Delay: Fifteen second minimum, to prevent false operation.
4. Mounting: Twist lock complies with NEMA C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure.

2.3 INDOOR OCCUPANCY SENSORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cooper Industries, Inc.
2. Hubbell Building Automation, Inc.
3. Leviton Manufacturing Co., Inc.
4. Lithonia Lighting; Acuity Brands Lighting, Inc.
5. Lutron Electronics Co., Inc.
6. Sensor Switch, Inc.
7. Watt Stopper.
8. Or equal.

B. General Requirements for Sensors: Wall- or ceiling-mounted, solid-state indoor occupancy sensors with a separate power pack.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
3. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack.
4. Power Pack: Dry contacts rated for 20-A ballast load at 120-ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
5. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outletbox.
 - b. Relay: Externally mounted through a 1/2-inch (13-mm) knockout in a standard electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
6. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
7. Bypass Switch: Override the "on" function in case of sensor failure.
8. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc (21.5 to 2152 lux); turn lights off when selected lighting level is present.

C. Ultrasonic Type: Ceiling mounted; detect occupants in coverage area through pattern changes of reflected ultrasonic energy .

1. Detector Sensitivity: Detect a person of average size and weight moving not less than 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
2. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.

D. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.

1. Sensitivity Adjustment: Separate for each sensing technology.
2. Detector Sensitivity: Detect occurrences of 6-inch- (150-mm-) minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. (232 sq. cm), and detect a person of average size and weight moving not less than 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.

2.4 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

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. Cooper Industries, Inc.
2. Hubbell Building Automation, Inc.
3. Leviton Manufacturing Co., Inc.
4. Lithonia Lighting; Acuity Brands Lighting, Inc.
5. Lutron Electronics Co., Inc.
6. Sensor Switch, Inc.
7. Watt Stopper.
8. Or equal.

B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor, suitable for mounting in a single gang switchbox.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application, and shall comply with California Title 24.
2. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F (0 to 49 deg C).
3. Switch Rating: Not less than 800-VA fluorescent at 120 V.

C. Wall-Switch Sensor Tag WS2:

1. Standard Range: 210-degree field of view, with a minimum coverage area of 900 sq. ft. (84 sq. m).
2. Sensing Technology: PIR.
3. Switch Type: SP, manual "on," automatic "off."
4. Voltage: Dual voltage, 120 V; dual-technology type.
5. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc (108 to 1600 lux). The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
6. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
7. Concealed "off" time-delay selector at 30 seconds, and 5, 10, and 20 minutes.

2.5 LIGHTING CONTACTORS

- 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. Allen-Bradley/Rockwell Automation.
 2. ASCO Power Technologies, LP.
 3. Eaton Corporation.
 4. Square D.
 5. Or equal.
- B. Description: Electrically operated and mechanically held lighting contactors, complying with NEMA ICS 2 and UL 508.
1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).
 2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
 3. Enclosure: Comply with NEMA 250.
- C. BAS Interface: Provide hardware interface to enable the BAS to monitor and control lighting contactors.

2.6 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 SENSOR INSTALLATION

- A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.
- B. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.2 CONTACTOR INSTALLATION

- A. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.3 WIRING INSTALLATION

- A. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch (13 mm).
- B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.4 IDENTIFICATION

- A. Identify components and power and control wiring according to Section 260553 "Identification for Electrical Systems."
 - 1. Identify controlled circuits in lighting contactors.
 - 2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.
- B. Label time switches and contactors with a unique designation.

3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Lighting control devices will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

3.6 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
 - 1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.

END OF SECTION

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SECTION 26 24 13

SWITCHBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Service and distribution switchboards rated 600 V and less.
 - 2. Disconnecting and overcurrent protective devices.

1.3 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Switchboards shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of switchboard, overcurrent protective device, transient voltage suppression device, ground-fault protector, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
- B. Shop Drawings: For each switchboard and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings.
 - 2. Detail enclosure types for types other than NEMA 250, Type 1.
 - 3. Detail bus configuration, current, and voltage ratings.
 - 4. Detail short-circuit current rating of switchboards and overcurrent protective devices.
 - 5. Include descriptive documentation of optional barriers specified for electrical insulation and isolation.
 - 6. Detail utility company's metering provisions with indication of approval by utility company.
 - 7. Include evidence of NRTL listing for series rating of installed devices.
 - 8. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 9. Include diagram and details of proposed mimic bus.

10. Include schematic and wiring diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Seismic Qualification Certificates: Submit certification that switchboards, overcurrent protective devices, accessories, and components will withstand seismic forces.
 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field Quality-Control Reports:
 1. Test procedures used.
 2. Test results that comply with requirements.
 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For switchboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01, include the following:
 1. Routine maintenance requirements for switchboards and all installed components.
 2. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers qualified as defined in NEMA PB 2.1 and trained in electrical safety as required by NFPA 70E.
- B. Testing Agency Qualifications: Member company of NETA or an NRTL.
 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- C. Source Limitations: Obtain switchboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.
- D. Product Selection for Restricted Space: Drawings indicate maximum dimensions for switchboards including clearances between switchboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- F. Comply with NEMA PB 2.
- G. Comply with NFPA 70.
- H. Comply with UL 891.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver switchboards in sections or lengths that can be moved past obstructions in delivery path.
- B. Remove loose packing and flammable materials from inside switchboards.
- C. See "Testing and Inspecting" Article in the Evaluations for guidance on which option to select in paragraph below.
- D. Handle and prepare switchboards for installation according to NEMA PB 2.1.

1.9 PROJECT CONDITIONS

- A. Installation Pathway: Remove and replace access fencing, doors, lift-out panels, and structures to provide pathway for moving switchboards into place.
- B. Environmental Limitations:
 - 1. Do not deliver or install switchboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above switchboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 - 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - a. Ambient Temperature: Not exceeding 104 deg F (40 deg C).
 - b. Altitude: Not exceeding 6600 feet (2000 m).
- C. Service Conditions: NEMA PB 2, usual service conditions, as follows:
 - 1. Ambient temperatures within limits specified.
 - 2. Altitude not exceeding 6600 feet (2000 m).

1.10 COORDINATION

- A. Coordinate layout and installation of switchboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

1.11 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices 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 MANUFACTURED UNITS

- 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. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
 - 5. Or equal.
- B. Front-Connected, Front-Accessible Switchboards:
 - 1. Main Devices: Fixed, individually mounted.
 - 2. Branch Devices: Panel mounted.
 - 3. Sections front and rear aligned.
- C. Nominal System Voltage: 208Y/120 V.
- D. Main-Bus Continuous: 800 A.
- E. Seismic Requirements: Fabricate and test switchboards according to IEEE 344 to withstand seismic forces.
- F. Indoor Enclosures: Steel, NEMA 250, Type 1.
- G. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer's standard gray finish over a rust-inhibiting primer on treated metal surface.
- H. Barriers: Between adjacent switchboard sections.
- I. Utility Metering Compartment: Fabricated, barrier compartment and section complying with utility company's requirements; hinged sealed door; buses provisioned for mounting utility company's current transformers and potential transformers or potential taps as required by utility company. If separate vertical section is required for utility metering, match and align with basic switchboard. Provide service entrance label and necessary applicable service entrance features.
- J. Bus Transition and Incoming Pull Sections: Matched and aligned with basic switchboard.
- K. Buses and Connections: Three phase, four wire unless otherwise indicated.

1. Phase- and Neutral-Bus Material: Hard-drawn copper of 98 percent conductivity, silver-plated, with copper feeder circuit-breaker line connections.
2. Load Terminals: Insulated, rigidly braced, runback bus extensions, of same material as through buses, equipped with mechanical connectors for outgoing circuit conductors. Provide load terminals for future circuit-breaker positions at full-ampere rating of circuit-breaker position.
3. Ground Bus: Minimum-size required by UL 891, hard-drawn copper of 98 percent conductivity, equipped with mechanical connectors for feeder and branch-circuit ground conductors.
4. Neutral Buses: 100 percent of the ampacity of phase buses unless otherwise indicated, equipped with mechanical connectors for outgoing circuit neutral cables. Brace bus extensions for busway feeder neutral bus.

2.2 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
 1. Frame Size 200A and Greater: Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:
 - a. Adjustable instantaneous trip.
 - b. Adjustable long- and short-time pickup levels.
 - c. Adjustable Long- and short-time time adjustments.
 2. Frame Size Less Than 200A: Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 150 A and larger.
 3. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor material.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Receive, inspect, handle, and store switchboards according to NECA 400.
- B. Examine switchboards before installation. Reject switchboards that are moisture damaged or physically damaged.
- C. Examine elements and surfaces to receive switchboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install switchboards and accessories according to NEMA PB 2.1.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from switchboard units and components.
- C. Comply with mounting and anchoring requirements per manufacturer's recommendation.
- D. Install filler plates in unused spaces of panel-mounted sections.
- E. Install overcurrent protective devices.
 - 1. Set field-adjustable switches and circuit-breaker trip ranges.
- F. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- B. Switchboard Nameplates: Label each switchboard compartment with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- C. Device Nameplates: Label each disconnecting and overcurrent protective device and each meter and control device mounted in compartment doors with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 3. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Switchboard will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports, including a certified report that identifies switchboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges as indicated.

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SECTION 26 24 16

PANELBOARDS

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. Lighting and appliance branch-circuit panelboards.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
 - 2. Detail enclosure types and details for types other than NEMA 250, Type 1.
 - 3. Detail bus configuration, current, and voltage ratings.
 - 4. Short-circuit current rating of panelboards and overcurrent protective devices.
 - 5. Include evidence of NRTL listing for series rating of installed devices.
 - 6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 7. Include wiring diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Seismic Qualification Certificates: Submit certification that panelboards, overcurrent protective devices, accessories, and components will withstand seismic forces.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

- C. Field Quality-Control Reports:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- D. Panelboard Schedules: For installation in panelboards.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01, include the following:
 - 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Keys: Two spares for each type of panelboard cabinet lock.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.
- C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Comply with NEMA PB 1.
- F. Comply with NFPA 70.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.

- B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.9 PROJECT CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - a. Ambient Temperature: Not exceeding minus 22 deg F (minus 30 deg C) to plus 104 deg F (plus 40 deg C).
 - b. Altitude: Not exceeding 6600 feet (2000 m).

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet (2000 m).

1.10 COORDINATION

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

1.11 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices 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 GENERAL REQUIREMENTS FOR PANELBOARDS

- A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces.

- B. Enclosures: Surface-mounted cabinets.
 - 1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
 - 2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
 - 3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
 - 4. Finishes:
 - a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
 - b. Back Boxes: Same finish as panels and trim.
 - 5. Directory Card: Inside panelboard door, mounted in transparent cardholder.
- C. Incoming Mains Location: Top.
- D. Phase, Neutral, and Ground Buses:
 - 1. Material: Hard-drawn copper, 98 percent conductivity.
 - 2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
- E. Conductor Connectors: Suitable for use with conductor material and sizes.
 - 1. Material: Tin-plated aluminum.
 - 2. Main and Neutral Lugs: Mechanical type.
 - 3. Ground Lugs and Bus-Configured Terminators: Mechanical type.
- F. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
- B. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD Type 1.

2.3 DISTRIBUTION PANELBOARDS

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- 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. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 3. Siemens Energy & Automation, Inc.
 4. Square D; a brand of Schneider Electric.
 5. Or equal.
- B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- C. Mains: Circuit breaker.
- D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.5 ELECTRONIC-GRADE PANELBOARDS

- 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. Current Technology; a subsidiary of Danahar Corporation.
 2. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 3. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 4. Liebert Corporation.
 5. Siemens Energy & Automation, Inc.
 6. Square D; a brand of Schneider Electric.
 7. Or equal.
- B. Panelboards: NEMA PB 1; with factory-installed, integral TVSS; labeled by an NRTL for compliance with UL 67 after installing TVSS.
- C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
- D. Main Overcurrent Protective Devices: Bolt-on thermal-magnetic circuit breakers.
- E. Branch Overcurrent Protective Devices: Bolt-on thermal-magnetic circuit breakers.
- F. Buses:
1. Copper phase and neutral buses; 200 percent capacity neutral bus and lugs.
 2. Copper equipment ground buses.

2.6 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- 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. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 3. Siemens Energy & Automation, Inc.
 4. Square D; a brand of Schneider Electric.
 5. Or equal.
- B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 150 A and larger.
 2. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
 - c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.
- B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
- C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install panelboards and accessories according to NEMA PB 1.1.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
- C. Comply with mounting and anchoring requirements per manufacturer's recommendation.
- D. Mount top of trim 90 inches (2286 mm) above finished floor unless otherwise indicated.

- E. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- F. Install overcurrent protective devices and controllers not already factory installed.
 - 1. Set field-adjustable, circuit-breaker trip ranges.
- G. Install filler plates in unused spaces.
- H. Stub four 1-inch (27-GRC) empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch (27-GRC) empty conduits into raised floor space or below slab not on grade.
- I. Arrange conductors in gutters into groups and bundle and wrap with wire ties.
- J. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 260553 "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- C. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- D. Panelboards will be considered defective if they do not pass tests and inspections.

- E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

- A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges as indicated

END OF SECTION

SECTION 26 27 16

ELECTRICAL CABINETS AND ENCLOSURES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes hinged cover enclosures, cabinets, terminal blocks, and accessories.
- B. Related Sections:
 - 1. Division 26 - Grounding and Bonding for Electrical Systems.
 - 2. Division 26 - Raceway and Boxes for Electrical Systems.
 - 3. Division 27 - Conduits and Backboxes for Communications Systems.
 - 4. Division 28 - Conduits and Backboxes for Electronic Safety and Security.

1.2 REFERENCES

- A. National Electrical Manufacturers Association:
 - 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 2. NEMA ICS 4 - Industrial Control and Systems: Terminal Blocks.
 - 3. ANSI / NFPA 70 – National Electrical Code / California Electrical Code.

1.3 SUBMITTALS

- A. Division 01 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit manufacturer's standard data for enclosures, cabinets, and terminal blocks.
- C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Acceptance or no exceptions taken by the engineer on any substitution proposed by the contractor shall not be construed as relieving the contractor from compliance with the project's specifications and performance requirements nor departure there from. The contractor remains responsible for details and accuracy for confirming and correlating quantities and dimensions and for the selection of fabrication processes, techniques and assembly, coordination of his work with that of all other trades and making any needed modifications consequent to the substitution at his own cost and for performing the work in a safe manner.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum 2 years documented experience.

1.5 EXTRA MATERIALS

- A. Division 01 - Execution and Closeout Requirements: Spare parts and maintenance products.

- B. Furnish two of each key.

PART 2 PRODUCTS

2.1 HINGED COVER ENCLOSURES

- A. Construction: NEMA 250, Type 1 for interior dry locations and Type 3R for outdoor locations, steel enclosure unless otherwise noted. In Operating Rooms, Invasive Procedure Rooms, or Scanning Room use stainless steel, unless otherwise noted.
- B. Covers: Continuous hinge, held closed by flush latch operable by key.
- C. Furnish interior plywood panel for mounting terminal blocks and electrical components; finish with white enamel.
- D. Enclosure Finish: Manufacturer's standard enamel.

2.2 CABINETS

- A. Boxes: Galvanized steel with removable end walls.
- B. Box Size: 24 inches wide x 30 inches high x 6 inches deep.
- C. Backboard: Furnish 3/4 inch thick plywood backboard for mounting terminal blocks. Paint matte white.
- D. Fronts: Steel, flush or surface type, as indicated on drawings, with concealed trim clamps, keyed to match branch circuit panelboard. Finish with gray baked enamel.
- E. Knockouts: As required for conduit entry.
- F. Furnish metal barriers to form separate compartments for wiring of different systems and voltages.
- G. Furnish metal barriers to form separate compartments for wiring of normal and emergency circuits.
- H. Furnish accessory feet for free-standing equipment.

2.3 TERMINAL BLOCKS

- A. Terminal Blocks: NEMA ICS 4.
- B. Power Terminals: Unit construction type with closed back and tubular pressure screw connectors, rated 600 volts.
- C. Signal and Control Terminals: Modular construction type, suitable for channel mounting, with tubular pressure screw connectors, rated 300 volts.
- D. Furnish ground bus terminal block, with each connector bonded to enclosure.

2.4 PLASTIC RACEWAY

- A. Product Description: Plastic channel with hinged or snap-on cover.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Verify that surfaces are ready to receive work.
- B. Install products in accordance with manufacturer's instructions.
- C. Install enclosures and boxes plumb. Anchor securely to wall and structural supports at each corner in accordance with Division 26.
- D. Install cabinet fronts plumb.

3.2 CLEANING

- A. Division 01 - Execution and Closeout Requirements: Final cleaning.
- B. Clean electrical parts to remove conductive and harmful materials.
- C. Remove dirt and debris from enclosure.
- D. Clean finishes and touch up damage.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

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. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Weather-resistant receptacles.
3. Snap switches and wall-box dimmers.
4. Wall-switch and exterior occupancy sensors.
5. Communications outlets.
6. Floor service outlets, poke-through assemblies, service poles, and multi outlet assemblies.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- D. RFI: Radio-frequency interference.
- E. TVSS: Transient voltage surge suppressor.
- F. UTP: Unshielded twisted pair.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:

1. Receptacles for Owner-Furnished Equipment: Match plug configurations.
2. Cord and Plug Sets: Match equipment requirements.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

1.6 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Service-Outlet Assemblies: One for every 10, but no fewer than one.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - 1. Cooper Wiring Devices; Division of Cooper Industries, Inc. (Cooper).
 - 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 - 3. Leviton Mfg. Company Inc. (Leviton).
 - 4. Pass & Seymour/Legrand (Pass & Seymour).
 - 5. Or equal.
- B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
2. Devices shall comply with the requirements in this Section.

2.3 STRAIGHT-BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FSW-C-596.

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. Cooper; 5351 (single), CR5362 (duplex).
 - b. Hubbell; HBL5351 (single), HBL5352 (duplex).
 - c. Leviton; 5891 (single), 5352 (duplex).
 - d. Pass & Seymour; 5361 (single), 5362 (duplex).
 - e. Or equal.

2.4 GFCI RECEPTACLES

A. General Description:

1. Straight blade, non-feed-through type.
2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FSW-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

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. Cooper; VGF20.
 - b. Hubbell; GFR5352L.
 - c. Pass & Seymour; 2095.
 - d. Leviton; 7590.
 - e. Or equal.

2.5 CORD AND PLUG SETS

A. Description:

1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.
2. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
3. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.6 TOGGLE SWITCHES

- A. Comply with NEMA WD 1, UL 20, and FSW-S-896.
- B. Switches, 120/277 V, 20 A:
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Single Pole:
 - 2) Cooper; AH1221.
 - 3) Hubbell; HBL1221.
 - 4) Leviton; 1221-2.
 - 5) Pass & Seymour; CSB20AC1.
 - 6) Or equal.
 - 7) Two Pole:
 - 8) Cooper; AH1222.
 - 9) Hubbell; HBL1222.
 - 10) Leviton; 1222-2.
 - 11) Pass & Seymour; CSB20AC2.
 - 12) Or equal.
 - 13) Three Way:
 - 14) Cooper; AH1223.
 - 15) Hubbell; HBL1223.
 - 16) Leviton; 1223-2.
 - 17) Pass & Seymour; CSB20AC3.
 - 18) Or equal.

2.7 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.
 - 1. Plate-Securing Screws: Metal with head color to match plate finish.
 - 2. Material for Finished Spaces: 0.035-inch- (1-mm-) thick, satin-finished, Type 302 stainless steel.
 - 3. Material for Unfinished Spaces: Galvanized steel.
 - 4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

2.8 FLOOR SERVICE FITTINGS

- A. Type: Modular, flush-type, dual-service units suitable for wiring method used.
- B. Compartments: Barrier separates power from voice and data communication cabling.

- C. Service Plate: Rectangular, solid brass with satin finish.
- D. Power Receptacle: NEMA WD 6 Configuration 5-20R, gray finish, unless otherwise indicated.
- E. Voice and Data Communication Outlet: Two modular, keyed, color-coded, RJ-45 jacks for UTP cable complying with requirements in Section 271500 "Communications Horizontal Cabling."

2.9 POKE-THROUGH 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. Hubbell Incorporated; Wiring Device-Kellems.
- 2. Pass & Seymour/Legrand.
- 3. Square D/Schneider Electric.
- 4. Thomas & Betts Corporation.
- 5. Wiremold/Legrand.
- 6. Or equal.

- B. Description:

- 1. Factory-fabricated and -wired assembly of below-floor junction box with multi channeled, through-floor raceway/firestop unit and detachable matching floor service-outlet assembly.
- 2. Comply with UL 514 scrub water exclusion requirements.
- 3. Service-Outlet Assembly: Flush type with four simplex receptacles and space for four RJ-45 jacks complying with requirements in Section 271500 "Communications Horizontal Cabling."
- 4. Size: Selected to fit nominal 4-inch (100-mm) cored holes in floor and matched to floor thickness.
- 5. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.
- 6. Closure Plug: Arranged to close unused 4-inch (100-mm) cored openings and reestablish fire rating of floor.
- 7. Wiring Raceways and Compartments: For a minimum of four No. 12 AWG conductors and a minimum of four, four-pair cables that comply with requirements in Section 271500 "Communications Horizontal Cabling."

2.10 FINISHES

- A. Device Color:

- 1. Wiring Devices Connected to Normal Power System: White or as selected by Architect and Resident Engineer unless otherwise indicated or required by NFPA 70 or device listing.
- 2. Wiring Devices Connected to Emergency Power System: Red.
- 3. TVSS Devices: Blue.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
 - 1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
 - 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
- D. Device Installation:
 - 1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
 - 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
 - 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
 - 4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
 - 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
 - 6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
 - 7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
 - 8. Tighten unused terminal screws on the device.
 - 9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
- E. Receptacle Orientation:
 - 1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the right.
- F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

- G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi gang wall plates.
- H. Adjust locations of floor service outlets to suit arrangement of furnishings.

3.2 GFCI RECEPTACLES

- A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 IDENTIFICATION

- A. Comply with Section 260553 "Identification for Electrical Systems."
- B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Test Instruments: Use instruments that comply with UL 1436.
 - 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- B. Tests for Convenience Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
 - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
 - 6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- C. Wiring device will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION

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SECTION 26 28 13

FUSES

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. Cartridge fuses rated 600-V ac and less for use in enclosed switches.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material, dimensions, descriptions of individual components, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:

- 1. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.
 - a. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
 - b. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.
- 2. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
- 3. Current-limitation curves for fuses with current-limiting characteristics.
- 4. Coordination charts and tables and related data.
- 5. Fuse sizes for elevator feeders and elevator disconnect switches.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01, include the following:

- 1. Ambient temperature adjustment information.
- 2. Coordination charts and tables and related data.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.
- 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. Comply with NEMA FU 1 for cartridge fuses.
- D. Comply with NFPA 70.

1.7 PROJECT CONDITIONS

- A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F (5 deg C) or more than 100 deg F (38 deg C), apply manufacturer's ambient temperature adjustment factors to fuse ratings.

1.8 COORDINATION

- A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

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. Cooper Bussmann, Inc.
 - 2. Edison Fuse, Inc.
 - 3. Ferraz Shawmut, Inc.
 - 4. Littelfuse, Inc.
 - 5. Or equal.

2.2 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.
- B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.
- C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.
- D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

- A. Cartridge Fuses:
 - 1. Motor Branch Circuits: Class RK5, time delay.
 - 2. Other Branch Circuits: Class RK1, time delay.

3.3 INSTALLATION

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.4 IDENTIFICATION

- A. Install labels complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION

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SECTION 26 28 16

ENCLOSED SWITCHES AND CIRCUITBREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Fusible switches.

1.3 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.4 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
 - 1. Enclosure types and details for types other than NEMA 250, Type 1.
 - 2. Current and voltage ratings.
 - 3. Short-circuit current ratings (interrupting and withstand, as appropriate).
 - 4. Include evidence of NRTL listing for series rating of installed devices.
 - 5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.

- B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Wiring Diagrams: For power, signal, and control wiring.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Seismic Qualification Certificates: For enclosed switches and circuit breakers, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field quality-control reports.
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- D. Manufacturer's field service report.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01, include the following:
 - 1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
 - 2. Fuse Pullers: Two for each size and type.

1.9 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.
- C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Comply with NFPA 70.

1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - 1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).
 - 2. Altitude: Not exceeding 6600 feet (2010 m).

1.11 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

- 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. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
 - 5. Or equal.

- B. Type HD, Heavy Duty, Single Throw, 240-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
 - 4. Lugs: Mechanical type, suitable for number, size, and conductor material.
- D. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
 - 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
 - 2. Outdoor Locations: NEMA 250, Type 3R.
 - 3. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- B. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."
- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- D. Install fuses in fusible devices.
- E. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- C. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 3. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

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SECTION 26 32 13

ENGINE GENERATORS

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 packaged engine-generator sets for emergency power supply with the following features:
 - 1. Diesel engine.
 - 2. Unit-mounted cooling system.
 - 3. Unit-mounted control and monitoring.
 - 4. Performance requirements for sensitive loads.
 - 5. Outdoor enclosure.
- B. Related Sections include the following:
 - 1. Section 263600 "Transfer Switches" for transfer switches including sensors and relays to initiate automatic-starting and -stopping signals for engine-generator sets.

1.3 DEFINITIONS

- A. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.
- B. LP: Liquid petroleum.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of packaged engine generator indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. In addition, include the following:
 - 1. Thermal damage curve for generator.
 - 2. Time-current characteristic curves for generator protective device.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Dimensioned outline plan and elevation drawings of engine-generator set and other components specified.
2. Design Calculations: Signed and sealed by a qualified professional engineer. Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
3. Vibration Isolation Base Details: Signed and sealed by a qualified professional engineer. Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include base weights.
4. Wiring Diagrams: Power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturer Seismic Qualification Certification: Submit certification that engine-generator set, batteries, battery racks, accessories, and components will withstand seismic forces.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Qualification Data: For installer.

C. Source quality-control test reports.

1. Certified summary of prototype-unit test report.
2. Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.
3. Certified Summary of Performance Tests: Certify compliance with specified requirement to meet performance criteria for sensitive loads.
4. Report of factory test on units to be shipped for this Project, showing evidence of compliance with specified requirements.
5. Report of sound generation.
6. Report of exhaust emissions showing compliance with applicable regulations.
7. Certified Torsional Vibration Compatibility: Comply with NFPA 110.

D. Field quality-control test reports.

E. Warranty: Manufacturer's standard warranty specified in this Section.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For packaged engine generators to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01, include the following:
1. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- 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. Fuses: One for every 10 of each type and rating, but no fewer than one of each.
 2. Indicator Lamps: Two for every six of each type used, but no fewer than two of each.
 3. Filters: One set each of lubricating oil, fuel, and combustion-air filters.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
1. Maintenance Proximity: Not more than four hours' normal travel time from Installer's place of business to Project site.
 2. Engineering Responsibility: Preparation of data for vibration isolators and seismic restraints of engine skid mounts, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Manufacturer Qualifications: A qualified manufacturer. Maintain, within 200 miles (321 km) of Project site, a service center capable of providing training, parts, and emergency maintenance repairs.
- C. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL), and that is acceptable to authorities having jurisdiction.
1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
- D. Source Limitations: Obtain packaged generator sets and auxiliary components through one source from a single manufacturer.
- 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. Comply with ASME B15.1.
- G. Comply with NFPA 37.

- H. Comply with NFPA 70.
- I. Comply with NFPA 110 requirements for Level 1 emergency power supply system.
- J. Comply with UL 2200.
- K. Engine Exhaust Emissions: Comply with applicable state and local government requirements.
- L. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by generator set including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.

1.9 PROJECT CONDITIONS

- A. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
 - 1. Ambient Temperature: 5 to 40 deg C.
 - 2. Relative Humidity: 0 to 95 percent.
 - 3. Altitude: Sea level to 1000 feet (300 m).

1.10 COORDINATION

- A. Coordinate size and location of concrete bases for package engine generators. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

1.11 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 5 years from date of Substantial Completion.

1.12 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include quarterly exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

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:

1. Caterpillar; Engine Div.
2. Generac Power Systems, Inc.
3. Kohler Co.
4. Onan/Cummins Power Generation; Industrial Business Group.
5. Or equal.

2.2 ENGINE-GENERATOR SET

A. Factory-assembled and -tested, engine-generator set.

B. Mounting Frame: Maintain alignment of mounted components without depending on concrete foundation; and have lifting attachments.

1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and generator-set center of gravity.

C. Capacities and Characteristics:

1. Power Output Ratings: Nominal ratings as indicated.
2. Output Connections: Three-phase, four wire.
3. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.

D. Generator-Set Performance:

1. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage from no load to full load.
2. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.
3. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.
4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
5. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
6. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50percent.
7. Sustained Short-Circuit Current: For a 3-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.

8. Start Time: Comply with NFPA 110, Type 10, system requirements.

E. Generator-Set Performance for Sensitive Loads:

1. Oversizing generator compared with the rated power output of the engine is permissible to meet specified performance.
 - a. Nameplate Data for Oversized Generator: Show ratings required by the Contract Documents rather than ratings that would normally be applied to generator size installed.
2. Steady-State Voltage Operational Bandwidth: 1 percent of rated output voltage from no load to full load.
3. Transient Voltage Performance: Not more than 10 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within 0.5 second.
4. Steady-State Frequency Operational Bandwidth: Plus or minus 0.25 percent of rated frequency from no load to full load.
5. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
6. Transient Frequency Performance: Less than 2-Hz variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within three seconds.
7. Output Waveform: At no load, harmonic content measured line to neutral shall not exceed 2 percent total with no slot ripple. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
8. Sustained Short-Circuit Current: For a 3-phase, bolted short circuit at system output terminals, system shall supply a minimum of 300 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to winding insulation or other generator system components.
9. Excitation System: Performance shall be unaffected by voltage distortion caused by nonlinear load.
 - a. Provide permanent magnet excitation for power source to voltage regulator.
10. Start Time: Comply with NFPA 110, Type 10, system requirements.

2.3 ENGINE

- A. Fuel: Fuel oil, Grade DF-2.
- B. Rated Engine Speed: 1800 rpm.
- C. Maximum Piston Speed for Four-Cycle Engines: 2250 fpm (11.4 m/s).
- D. Lubrication System: The following items are mounted on engine orskid:
 1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
 2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.

3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.

E. Engine Fuel System:

1. Main Fuel Pump: Mounted on engine. Pump ensures adequate primary fuel flow under starting and load conditions.
2. Relief-Bypass Valve: Automatically regulates pressure in fuel line and returns excess fuel to source.
3. Dual Natural Gas with LP-Gas Backup (Vapor-Withdrawal) System:
 - a. Carburetor.
 - b. Secondary Gas Regulators: One for each fuel type.
 - c. Fuel-Shutoff Solenoid Valves: One for each fuel source.
 - d. Flexible Fuel Connectors: One for each fuel source.

F. Coolant Jacket Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity.

G. Governor: Mechanical.

H. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine-generator-set mounting frame and integral engine-driven coolant pump.

1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
2. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
3. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.
4. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
5. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, ultraviolet-, and abrasion-resistant fabric.
 - a. Rating: 50-psig (345-kPa) maximum working pressure with coolant at 180 deg F (82 deg C), and noncollapsible under vacuum.
 - b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.

I. Cooling System: Closed loop, liquid cooled, with remote radiator and integral engine-driven coolant pump.

1. Configuration: Vertical air discharge.
2. Radiator Core Tubes: Nonferrous-metal construction other than aluminum.
3. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
4. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.
5. Fan: Driven by totally enclosed electric motor with sealed bearings.

6. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
 7. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
- J. Muffler/Silencer: Critical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.
1. Minimum sound attenuation of 25 dB at 500 Hz.
 2. Sound level measured at a distance of 10 feet (3 m) from exhaust discharge after installation is complete shall be 85 dBA or less.
- K. Air-Intake Filter: Heavy-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.
- L. Starting System: 24-V electric, with negative ground.
1. Components: Sized so they will not be damaged during a full engine-cranking cycle with ambient temperature at maximum specified in Part 1 "Project Conditions" Article.
 2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
 3. Cranking Cycle: As required by NFPA 110 for system levels specified.
 4. Battery: Adequate capacity within ambient temperature range specified in Part 1 "Project Conditions" Article to provide specified cranking cycle at least twice without recharging.
 5. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
 6. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 10 deg C regardless of external ambient temperature within range specified in Part 1 "Project Conditions" Article. Include accessories required to support and fasten batteries in place.
 7. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.
 8. Battery Charger: Current-limiting, automatic-equalizing and float-charging type. Unit shall comply with UL 1236 and include the following features:
 - a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
 - b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 deg C to plus 60 deg C to prevent overcharging at high temperatures and undercharging at low temperatures.
 - c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
 - d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
 - e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.
 - f. Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

2.4 FUEL OIL STORAGE

- A. Comply with NFPA 30.
- B. Day Tank: Comply with UL 142, freestanding, factory-fabricated fuel tank assembly, with integral, float-controlled transfer pump and the following features:
 - 1. Containment: Integral rupture basin with a capacity of 150 percent of nominal capacity of day tank.
 - a. Leak Detector: Locate in rupture basin and connect to provide audible and visual alarm in the event of day-tank leak.
 - 2. Tank Capacity: As recommended by engine manufacturer for an uninterrupted period of 8 hours' operation at 100 percent of rated power output of engine-generator system without being refilled.
 - 3. Pump Capacity: Exceeds maximum flow of fuel drawn by engine-mounted fuel supply pump at 110 percent of rated capacity, including fuel returned from engine.
 - 4. Low-Level Alarm Sensor: Liquid-level device operates alarm contacts at 25 percent of normal fuel level.
 - 5. High-Level Alarm Sensor: Liquid-level device operates alarm and redundant fuel shutoff contacts at midpoint between overflow level and 100 percent of normal fuel level.
 - 6. Piping Connections: Factory-installed fuel supply and return lines from tank to engine; local fuel fill, vent line, overflow line; and tank drain line with shutoff valve.
 - 7. Redundant High-Level Fuel Shutoff: Actuated by high-level alarm sensor in day tank to operate a separate motor device that disconnects day-tank pump motor. Sensor shall signal solenoid valve, located in fuel suction line between fuel storage tank and day tank, to close. Both actions shall remain in shutoff state until manually reset. Shutoff action shall initiate an alarm signal to control panel but shall not shut down engine-generator set.
- C. Base-Mounted Fuel Oil Tank: Factory installed and piped, complying with UL 142 fuel oil tank. Features include the following:
 - 1. Tank level indicator.
 - 2. Capacity: Fuel for eight hours' continuous operation at 100 percent rated power output.
 - 3. Vandal-resistant fill cap.
 - 4. Containment Provisions: Comply with requirements of authorities having jurisdiction.

2.5 CONTROL AND MONITORING

- A. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of generator set. When mode-selector switch is switched to the on position, generator set starts. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of a remote emergency-stop switch also shuts down generator set.
- B. Manual Starting System Sequence of Operation: Switching on-off switch on the generator control panel to the on position starts generator set. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of a remote emergency-stop switch also shuts down generator set.

- C. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the generator set. Mounting method shall isolate the control panel from generator-set vibration.
- D. Indicating and Protective Devices and Controls: As required by NFPA 110 for Level 1 system, and the following:
1. AC voltmeter.
 2. AC ammeter.
 3. AC frequency meter.
 4. DC voltmeter (alternator battery charging).
 5. Engine-coolant temperature gage.
 6. Engine lubricating-oil pressure gage.
 7. Running-time meter.
 8. Ammeter-voltmeter, phase-selector switch(es).
 9. Generator-voltage adjusting rheostat.
 10. Fuel tank derangement alarm.
 11. Fuel tank high-level shutdown of fuel supply alarm.
 12. Generator overload.
- E. Indicating and Protective Devices and Controls:
1. AC voltmeter.
 2. AC ammeter.
 3. AC frequency meter.
 4. DC voltmeter (alternator battery charging).
 5. Engine-coolant temperature gage.
 6. Engine lubricating-oil pressure gage.
 7. Running-time meter.
 8. Ammeter-voltmeter, phase-selector switch(es).
 9. Generator-voltage adjusting rheostat.
 10. Start-stop switch.
 11. Overspeed shutdown device.
 12. Coolant high-temperature shutdown device.
 13. Coolant low-level shutdown device.
 14. Oil low-pressure shutdown device.
 15. Fuel tank derangement alarm.
 16. Fuel tank high-level shutdown of fuel supply alarm.
 17. Generator overload.
- F. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.
- G. Connection to Data Link: A separate terminal block, factory wired to Form C dry contacts, for each alarm and status indication is reserved for connections for data-link transmission of indications to remote data terminals. Consult with manufacturer for data system connections to terminals.

- H. Common Remote Audible Alarm: Comply with NFPA 110 requirements for Level 1 systems. Include necessary contacts and terminals in control and monitoring panel.
 - 1. Overcrank shutdown.
 - 2. Coolant low-temperature alarm.
 - 3. Control switch not in auto position.
 - 4. Battery-charger malfunction alarm.
 - 5. Battery low-voltage alarm.

- I. Common Remote Audible Alarm: Signal the occurrence of any events listed below without differentiating between event types. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset.
 - 1. Engine high-temperature shutdown.
 - 2. Lube-oil, low-pressure shutdown.
 - 3. Overspeed shutdown.
 - 4. Remote emergency-stop shutdown.
 - 5. Engine high-temperature prealarm.
 - 6. Lube-oil, low-pressure prealarm.
 - 7. Fuel tank, low-fuel level.
 - 8. Low coolant level.

- J. Remote Alarm Annunciator: Comply with NFPA 99. An LED labeled with proper alarm conditions shall identify each alarm event and a common audible signal shall sound for each alarm condition. Silencing switch in face of panel shall silence signal without altering visual indication. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset. Cabinet and faceplate are surface- or flush-mounting type to suit mounting conditions indicated.

- K. Remote Emergency-Stop Switch: Flush; wall mounted, unless otherwise indicated; and labeled. Push button shall be protected from accidental operation.

2.6 GENERATOR OVERCURRENT AND FAULT PROTECTION

- A. Generator Circuit Breaker: Molded-case, thermal-magnetic type; 100 percent rated; complying with NEMA AB 1 and UL 489.
 - 1. Tripping Characteristic: Designed specifically for generator protection.
 - 2. Trip Rating: Matched to generator rating.
 - 3. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.
 - 4. Mounting: Adjacent to or integrated with control and monitoring panel.

- B. Generator Protector: Microprocessor-based unit shall continuously monitor current level in each phase of generator output, integrate generator heating effect over time, and predict when thermal damage of alternator will occur. When signaled by generator protector or other generator-set protective devices, a shunt-trip device in the generator disconnect switch shall open the switch to disconnect the generator from load circuits. Protector shall perform the following functions:
 1. Initiates a generator overload alarm when generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other generator-set malfunction alarms.
 2. Under single or three-phase fault conditions, regulates generator to 300 percent of rated full-load current for up to 10 seconds.
 3. As overcurrent heating effect on the generator approaches the thermal damage point of the unit, protector switches the excitation system off, opens the generator disconnect device, and shuts down the generator set.
 4. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot.
- C. Ground-Fault Indication: Comply with NFPA 70, "Emergency System" signals for ground-fault. Integrate ground-fault alarm indication with other generator-set alarm indications.

2.7 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

- A. Comply with NEMA MG 1.
- B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.
- C. Electrical Insulation: Class H or Class F.
- D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required.
- E. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.
- F. Enclosure: Dripproof.
- G. Instrument Transformers: Mounted within generator enclosure.
- H. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified.
 1. Adjusting rheostat on control and monitoring panel shall provide plus or minus 5 percent adjustment of output-voltage operating band.
- I. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.
- J. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.
- K. Subtransient Reactance: 12 percent, maximum.

2.8 OUTDOOR GENERATOR-SET ENCLOSURE

- A. Description: Vandal-resistant, weatherproof steel housing, wind resistant up to 100 mph (160 km/h). Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.

2.9 VIBRATION ISOLATION DEVICES

A. Elastomeric Isolation Pads:

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. Ace Mountings Co., Inc.
- b. California Dynamics Corporation.
- c. Isolation Technology, Inc.
- d. Kinetics Noise Control, Inc.
- e. Mason Industries, Inc.
- f. Vibration Eliminator Co., Inc.
- g. Vibration Isolation.
- h. Vibration Mountings & Controls, Inc.
- i. Or 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: Smooth pattern.
6. Infused nonwoven cotton or synthetic fibers.
7. Load-bearing metal plates adhered to pads.
8. Sandwich-Core Material: Resilient and elastomeric.

- a. Surface Pattern: Smooth pattern.
- b. Infused nonwoven cotton or synthetic fibers.

B. Restrained Spring Isolators: Freestanding, Steel, Open-Spring Isolators with Vertical-Limit Stop Restraint in Two-Part Telescoping Housing: Insert drawing designation.

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. Ace Mountings Co., Inc.
- b. California Dynamics Corporation.
- c. Isolation Technology, Inc.
- d. Kinetics Noise Control, Inc.
- e. Mason Industries, Inc.
- f. Vibration Eliminator Co., Inc.
- g. Vibration Isolation.
- h. Vibration Mountings & Controls, Inc.
- i. Or 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 (3447kPa).
 - 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.

2.10 FINISHES

- A. Indoor and Outdoor Enclosures and Components: Manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.

2.11 SOURCE QUALITY CONTROL

- A. Prototype Testing: Factory test engine-generator set using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.
 1. Tests: Comply with NFPA 110, Level 1 Energy Converters and with IEEE115.
- B. Project-Specific Equipment Tests: Before shipment, factory test engine-generator set and other system components and accessories manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:
 1. Test components and accessories furnished with installed unit that are not identical to those on tested prototype to demonstrate compatibility and reliability.
 2. Full load run.
 3. Maximum power.
 4. Voltage regulation.
 5. Transient and steady-state governing.
 6. Single-step load pickup.
 7. Safety shutdown.
 8. Provide 14 days' advance notice of tests and opportunity for observation of tests by Owner's representative.
 9. Report factory test results within 10 days of completion of test.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine-generator performance.

- B. Examine roughing-in of piping systems and electrical connections. Verify actual locations of connections before packaged engine-generator installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with packaged engine-generator manufacturers' written installation and alignment instructions and with NFPA 110.
- B. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.
- C. Install packaged engine generator on cast-in-place concrete equipment bases. Comply with requirements for equipment bases and foundations specified in Division 03 "Cast-in-Place Concrete."
 - 1. Comply with requirements for seismic control devices.
 - 2. Comply with requirements for vibration isolation devices specified in this section.
- D. Install remote radiator with elastomeric isolator pads having a minimum deflection of 1 inch (25 mm) on concrete base on grade.
- E. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping and specialties.
- B. Connect engine exhaust pipe to engine with flexible connector.
- C. Connect fuel piping to engines with a gate valve and union and flexible connector.
- D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.4 IDENTIFICATION

- A. Identify system components according to Division 23 and Section 260553 "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

- A. 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.
- B. Tests and Inspections:
 - 1. Perform tests recommended by manufacturer and each electrical test and visual and mechanical inspection (except those indicated to be optional) for "AC Generators and for Emergency Systems" specified in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here including, but not limited to, single-step full-load pickup test.
 - 3. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.
 - a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
 - b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
 - c. Verify acceptance of charge for each element of the battery after discharge.
 - d. Verify that measurements are within manufacturer's specifications.
 - 4. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
 - 5. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine-generator system before and during system operation. Check for air, exhaust, and fluid leaks.
 - 6. Exhaust-System Back-Pressure Test: Use a manometer with a scale exceeding 40-inch wg (120 kPa). Connect to exhaust line close to engine exhaust manifold. Verify that back pressure at full-rated load is within manufacturer's written allowable limits for the engine.
 - 7. Exhaust Emissions Test: Comply with applicable government test criteria.
 - 8. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.
 - 9. Harmonic-Content Tests: Measure harmonic content of output voltage under 25 percent and at 100 percent of rated linear load. Verify that harmonic content is within specified limits.
 - 10. Noise Level Tests: Measure A-weighted level of noise emanating from generator-set installation, including engine exhaust and cooling-air intake and discharge, at four locations on the property line, and compare measured levels with required values.
- C. Coordinate tests with tests for transfer switches and run them concurrently.
- D. Test instruments shall have been calibrated within the last 12 months, traceable to standards of NIST, and adequate for making positive observation of test results. Make calibration records available for examination on request.

- E. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
- F. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
- G. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- H. Remove and replace malfunctioning units and retest as specified above.
- I. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.
- J. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

3.6 DEMONSTRATION

1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators. Refer to Division 01.

END OF SECTION

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SECTION 26 36 00
TRANSFER SWITCHES

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 transfer switches rated 600 V and less, including the following:
 - 1. Automatic transfer switches.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, weights, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.
 - 1. Single-Line Diagram: Show connections between transfer switch, bypass/isolation switch, power sources, and load; and show interlocking provisions for each combined transfer switch and bypass/isolation switch.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and testing agency.
- B. Manufacturer Seismic Qualification Certification: Submit certification that transfer switches accessories, and components will withstand seismic forces.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01, include the following:
1. Features and operating sequences, both automatic and manual.
 2. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Maintain a service center capable of providing training, parts, and emergency maintenance repairs within a response period of less than eight hours from time of notification.
- B. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
- C. Source Limitations: Obtain automatic transfer switches through one source from a single manufacturer.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Comply with NEMA ICS 1.
- F. Comply with NFPA 70.
- G. Comply with NFPA 110.
- H. Comply with UL 1008 unless requirements of these Specifications are stricter.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Contactor Transfer Switches:
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. Caterpillar; Engine Div.
 - b. Emerson; ASCO Power Technologies, L.P.
 - c. Generac Power Systems, Inc.
 - d. GE Zenith Controls.
 - e. Kohler Power Systems; Generator Division.

- f. Onan/Cummins Power Generation; Industrial Business Group.
- g. Russelectric, Inc.
- h. Or equal.

2.2 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS

- A. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.
- B. Tested Fault-Current Closing and Withstand Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.
 - 1. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination shall exceed indicated fault-current value at installation location.
- C. Solid-State Controls: Repetitive accuracy of all settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.
- D. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.
- E. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism, mechanically and electrically interlocked in both directions.
- F. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.
 - 1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are not acceptable.
 - 2. Switch Action: Double throw; mechanically held in both directions.
 - 3. Contacts: Silver composition or silver alloy for load-current switching. Conventional automatic transfer-switch units, rated 225 A and higher, shall have separate arcing contacts.
- G. Neutral Switching. Where four-pole switches are indicated, provide neutral pole switched simultaneously with phase poles.
- H. Neutral Terminal: Solid and fully rated, unless otherwise indicated.
- I. Oversize Neutral: Ampacity and switch rating of neutral path through units indicated for oversize neutral shall be double the nominal rating of circuit in which switch is installed.
- J. Heater: Equip switches exposed to outdoor temperatures and humidity, and other units indicated, with an internal heater. Provide thermostat within enclosure to control heater.
- K. Battery Charger: For generator starting batteries.
 - 1. Float type rated 10 A.
 - 2. Ammeter to display charging current.
 - 3. Fused ac inputs and dc outputs.

- L. Annunciation, Control, and Programming Interface Components: Devices at transfer switches for communicating with remote programming devices, annunciators, or annunciator and control panels shall have communication capability matched with remote device.
- M. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, either by color-code or by numbered or lettered wire and cable tape markers at terminations. Color-coding and wire and cable tape markers are specified in Section 260553 "Identification for Electrical Systems."
 - 1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.
 - 2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
 - 3. Control Wiring: Equipped with lugs suitable for connection to terminalstrips.
- N. Enclosures: General-purpose NEMA 250, Type 1, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.3 AUTOMATIC TRANSFER SWITCHES

- A. Comply with Level 1 equipment according to NFPA 110.
- B. Switching Arrangement: Double-throw type, incapable of pauses or intermediate position stops during normal functioning, unless otherwise indicated.
- C. Manual Switch Operation: Under load, with door closed and with either or both sources energized. Transfer time is same as for electrical operation. Control circuit automatically disconnects from electrical operator during manual operation.
- D. Manual Switch Operation: Unloaded. Control circuit automatically disconnects from electrical operator during manual operation.
- E. Signal-Before-Transfer Contacts: A set of normally open/normally closed dry contacts operates in advance of retransfer to normal source. Interval is adjustable from 1 to 30seconds.
- F. Digital Communication Interface: Matched to capability of remote annunciator or annunciator and control panel.
- G. Transfer Switches Based on Molded-Case-Switch Components: Comply with NEMA AB 1, UL 489, and UL 869A.
- H. Automatic Closed-Transition Transfer Switches: Include the following functions and characteristics:
 - 1. Fully automatic make-before-break operation.
 - 2. Load transfer without interruption, through momentary interconnection of both power sources not exceeding 100 ms.
 - 3. Initiation of No-Interruption Transfer: Controlled by in-phase monitor and sensors confirming both sources are present and acceptable.
 - a. Initiation occurs without active control of generator.
 - b. Controls ensure that closed-transition load transfer closure occurs only when the 2 sources are within plus or minus 5 electrical degrees maximum, and plus or minus 5 percent maximum voltage difference.

4. Failure of power source serving load initiates automatic break-before-make transfer.
- I. In-Phase Monitor: Factory-wired, internal relay controls transfer so it occurs only when the two sources are synchronized in phase. Relay compares phase relationship and frequency difference between normal and emergency sources and initiates transfer when both sources are within 15 electrical degrees, and only if transfer can be completed within 60 electrical degrees. Transfer is initiated only if both sources are within 2 Hz of nominal frequency and 70 percent or more of nominal voltage.
 - J. Motor Disconnect and Timing Relay: Controls designate starters so they disconnect motors before transfer and reconnect them selectively at an adjustable time interval after transfer. Control connection to motor starters is through wiring external to automatic transfer switch. Time delay for reconnecting individual motor loads is adjustable between 1 and 60 seconds, and settings are as indicated. Relay contacts handling motor-control circuit inrush and seal currents are rated for actual currents to be encountered.
 - K. Programmed Neutral Switch Position: Switch operator has a programmed neutral position arranged to provide a midpoint between the two working switch positions, with an intentional, time-controlled pause at midpoint during transfer. Pause is adjustable from 0.5 to 30 seconds minimum and factory set for 0.5 second, unless otherwise indicated. Time delay occurs for both transfer directions. Pause is disabled unless both sources are live.
 - L. Automatic Transfer-Switch Features:
 1. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.
 2. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals. Adjustable from zero to six seconds, and factory set for one second.
 3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.
 4. Time Delay for Retransfer to Normal Source: Adjustable from 0 to 30 minutes, and factory set for 10 minutes to automatically defeat delay on loss of voltage or sustained under voltage of emergency source, provided normal supply has been restored.
 5. Test Switch: Simulate normal-source failure.
 6. Switch-Position Pilot Lights: Indicate source to which load is connected.
 7. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.
 - a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
 - b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."
 8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.
 9. Transfer Override Switch: Overrides automatic retransfer control so automatic transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.
 10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.

11. Engine Shutdown Contacts: Instantaneous; shall initiate shutdown sequence at remote engine-generator controls after retransfer of load to normal source.
12. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods are adjustable from 10 to 30 minutes. Factory settings are for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:
 - a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.
 - b. Push-button programming control with digital display of settings.
 - c. Integral battery operation of time switch when normal control power is not available.

2.4 SOURCE QUALITY CONTROL

- A. Factory test and inspect components, assembled switches, and associated equipment. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Design each fastener and support to carry load indicated by seismic requirements and according to seismic-restraint details.
- B. Identify components according to Section 260553 "Identification for Electrical Systems."
- C. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

3.2 CONNECTIONS

- A. Wiring to Remote Components: Match type and number of cables and conductors to control and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.
- B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- C. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.
2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
3. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.
 - a. Check for electrical continuity of circuits and for short circuits.
 - b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
 - c. Verify that manual transfer warnings are properly placed.
 - d. Perform manual transfer operation.
4. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.
 - a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
 - b. Simulate loss of phase-to-ground voltage for each phase of normal source.
 - c. Verify time-delay settings.
 - d. Verify pickup and dropout voltages by data readout or inspection of control settings.
 - e. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.
 - f. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for 1 pole deviating by more than 50 percent from other poles.
 - g. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.
5. Ground-Fault Tests: Coordinate with testing of ground-fault protective devices for power delivery from both sources.
 - a. Verify grounding connections and locations and ratings of sensors.

B. Testing Agency's Tests and Inspections:

1. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.
2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

3. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.
 - a. Check for electrical continuity of circuits and for short circuits.
 - b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
 - c. Verify that manual transfer warnings are properly placed.
 - d. Perform manual transfer operation.
 4. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.
 - a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
 - b. Simulate loss of phase-to-ground voltage for each phase of normal source.
 - c. Verify time-delay settings.
 - d. Verify pickup and dropout voltages by data readout or inspection of control settings.
 - e. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.
 - f. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for 1 pole deviating by more than 50 percent from other poles.
 - g. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.
 5. Ground-Fault Tests: Coordinate with testing of ground-fault protective devices for power delivery from both sources.
 - a. Verify grounding connections and locations and ratings of sensors.
- C. Coordinate tests with tests of generator and run them concurrently.
- D. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.
- E. Remove and replace malfunctioning units and retest as specified above.
- F. Prepare test and inspection reports.
- 3.4 DEMONSTRATION
- A. Train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment as specified below. Refer to Division 01.
 - B. Coordinate this training with that for generator equipment.

END OF SECTION

SECTION 26 51 00
INTERIOR LIGHTING

PART 1 GENERAL

1.1 SUMMARY

- A. This section provides general requirements for a complete and fully operational lighting system including:
 - 1. Interior lighting fixtures
 - 2. Exterior lighting fixtures
 - 3. Lamps
 - 4. Ballasts
 - 5. Accessories
 - 6. Light fixture support

- B. Related Sections:
 - 1. Division 26 - Grounding and Bonding for Electrical Systems.
 - 2. Division 26 - Raceway and Boxes for Electrical Systems.

1.2 REFERENCES

- A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions, and Sections under Division 01 General Requirements.

- B. Conform to Reference Standards by date of issue current on date of Contract Documents, except where a specific date is established by code.
 - 1. ANSI/NFPA 70 National Electrical Code
 - 2. NFPA 101 Life Safety Code
 - 3. UL 57 Electrical Luminaires
 - 4. UL 496 Edison Base Lampholders
 - 5. UL 542 Lampholders, Starter Holders for Fluorescent Lamps
 - 6. UL 924 Emergency Lighting and Power Equipment
 - 7. UL 935 Fluorescent Lamp Ballasts
 - 8. UL 1029 HID Lamp Ballasts
 - 9. UL 1570 Fluorescent Luminaires
 - 10. UL 1572 High Intensity Discharge Luminaires
 - 11. UL 773 Plug-In Photo controls for Use with Area Lighting
 - 12. UBC Standard Section 47.1813 Luminaires
 - 13. ANSI/IESNA RP-29-06
 - 14. ANSI C82.1 - American National Standard for Lamp Ballast-Line Frequency Fluorescent Lamp Ballast.

1.3 SYSTEM DESCRIPTION

- A. Light Fixture Detail series and catalog numbers indicated are a design series reference and do not necessarily represent the exact catalog number, size, voltage, wattage, type of lamp, ballast, finish trim, ceiling type, mounting hardware, or special requirements as specified or as required by the particular installations. Provide complete fixture to correspond with the features, accessories, number of lamps, wattage and/or size specified in the text description of each fixture type. Additional features, accessories and options specified shall also be included.

- B. Provide all frames, supplementary support structures, hangers, spacers, stems, aligner canopies, auxiliary junction boxes and other hardware as required for a complete and proper installation. Recessed fixtures shall have frames that are compatible with the ceiling systems.
- C. Light fixture voltage shall match the voltage of the circuit serving the light fixture.

1.4 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7.
- B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with NFPA 70 and the California Electrical Code.
- E. Luminaires, ballasts, lamps and other components and controls shall equal or exceed the requirements of all applicable state and/or municipal energy codes.
- F. Designated manufacturers are listed to define the requirements for quality and function of the specified product. Equivalent or better products of other, unnamed manufacturers may be proposed for consideration by adhering to procedures set forth in this section and in Division 01 – Product Requirements.
- G. Mockups: Light Fixture Details for fixture type(s) requiring mockups. Provide lighting fixtures for room or module mockups.
 - 1. Obtain Lighting Designer's and Architect's approval of fixtures for mockups prior to starting installation.
 - 2. Install fixtures for mockups with power and control connections.
 - 3. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 4. Remove mockups when directed. Fixtures may be reinstalled in the Work with approval of Owner.
 - 5. Mockups evaluated on the project site may become part of the complete Work with the approval of the Owner, Lighting Designer, and Architect if the mockup is undisturbed at the time of substantial completion.

1.5 SUBMITTALS

- A. Comply with requirements of specification section describing Submittal Procedures
- B. The authorized manufacturer's representative for the project area shall prepare submittals for each lighting fixture type. In addition to the fixture submittals, a list shall be provided identifying the manufacturer representative for each fixture type. Provide manufacturers' names, addresses, and telephone numbers. Requests for prior approval shall also include this information. Submittals or requests for prior approval without this information will be rejected.

- C. Product Data shall indicate that light fixture, lamps, and ballasts fully comply with contract documents. Data shall be submitted for each type of light fixture indicated, arranged in order of fixture designation. For standard catalog fixtures provide original product catalog sheets indicating data on features, accessories, finishes, and the following:
1. Materials and dimensions of luminaires.
 2. Photometric data, in IESNA format, based on certified results of laboratory tests of each light fixture type, outfitted with lamps, ballasts, and accessories identical to those indicated for the light fixture as applied in the Project.
 - a. Photometric data shall be certified by a qualified independent testing agency.
 - b. Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program (NVLAP) for Energy Efficient Lighting Products.
 3. Emergency lighting unit battery and charger.
 4. Low voltage transformers.
 5. Fluorescent and high intensity discharge ballasts.
 6. LED power supplies.
 7. Types of lamps, including manufacturer, wattage, and Color Rendering Index (CRI) and color temperature in degrees Kelvin (K).
 8. Sound Performance Data: For air-handling light fixtures, indicate sound power level and sound transmission class in test report certified according to standards specified in Division 23 Diffusers, Registers, and Grilles.
 - 9.
- D. Shop Drawings shall:
1. Show details of nonstandard or custom fixtures.
 2. Indicate dimensions, weights, method of field assembly, components, features, and accessories.
 3. For custom fixtures, modified fixtures, or linear fluorescent fixtures mounted in continuous rows, submit scaled drawings prepared by the manufacturer showing all details of construction, lengths of runs, pendant and power feed locations, accessories, finishes, and lists of materials.
 4. Contractor to provide the manufacturer with accurate field dimensions where required.
 5. Wiring diagrams, power and control wiring.
- E. Wiring Diagrams shall detail wiring for fixtures and differentiate between manufacturer-installed and field-installed wiring.
- F. Coordination Drawings shall include reflected ceiling plans, sections, and other details drawn to scale and coordinating the following items:
1. Light fixtures
 2. Suspended ceiling components
 3. Structural members to which suspension systems for light fixtures will be attached
 4. Other items in finished ceiling including the following:
 - a. Air outlets and inlets
 - b. Speakers
 - c. Sprinklers
 - d. Smoke and fire detectors
 - e. Occupancy sensors
 - f. Access panels
 5. Perimeter moldings.
- G. Product Certificates shall be signed by manufacturers of lighting fixtures certifying that products comply with requirements.

- H. Dimming Ballast Compatibility Certificates shall be signed by the manufacturer of ballast certifying that ballasts are compatible with dimming systems and equipment with which they are used. Product certificates signed by the product manufacturer shall be provided for each type of ballast for bi-level and dimmer controlled fixtures.
- I. Maintenance Data shall be provided for lighting fixtures and equipment to include in emergency, operation, and maintenance manuals specified in specifications section describing Operations and Maintenance Data.
- J. Field quality control test reports.
- K. Special Warranties specified in this Section.
- L. Review of luminaire submittals which indicate voltage, mounting condition, or quantities shall not be considered to be approval of said voltage, mounting condition, or quantities. Contractor shall field verify voltage and actual mounting condition and method.
- M. Product samples complete with housing, trim, specified lamp, and 8' cord with plug shall be submitted if requested. Acceptance or no exceptions taken by the engineer on any substitution proposed by the contractor shall not be construed as relieving the contractor from compliance with the project's specifications and performance requirements nor departure there from. The contractor remains responsible for details and accuracy for confirming and correlating quantities and dimensions and for the selection of fabrication processes, techniques and assembly, coordination of his work with that of all other trades and making any needed modifications consequent to the substitution at his own cost and for performing the work in a safe manner.

1.6 SUBSTITUTIONS

- A. Comply with requirements of specification section describing Product Requirements.
- B. Lighting fixtures are based on the fixture types and manufacturers specified. If substitution of fixtures other than those specified is desired, product information must be submitted to the Lighting Designer 10-days prior to the close of the bid period. No requests for substitution will be accepted after this date.
- C. Substitution requests shall include all information required under in paragraph 1.6 - SUBMITTALS. Requests for approval shall be accompanied by a working fixture sample (including lamps, cord and plug). Provide the name of at least one installation where each proposed substitute has been installed for at least six months. Provide the name and telephone number of the Architect, Owners' Representative, and Lighting Designer or Engineer of record.
- D. Equipment delivery lead time shall not be held as a valid reason for requesting luminaire substitution unless luminaire lead time from specified manufacturer is in excess of 14 weeks. It shall be the sole responsibility of the Contractor to determine necessary equipment lead times, deliver submittals for review in a timely fashion, and place orders accordingly to ensure timely delivery.
- E. When requesting a substitution, Contractor shall provide unit and extended pricing for specified luminaire, unit and extended pricing for proposed alternate, and unit and extended savings to Owner to be realized by accepting proposed alternate. If requested, Contractor shall provide unit pricing for each luminaire type specified to provide a baseline comparison for substitution request.

- F. If required by the Lighting Designer, the proposed substitutions must be installed at the bidder's expense in a location selected by the Architect or Lighting Designer.
- G. If the substitution request is accepted, approval will be in the form of an addendum to the specifications issued to all registered plan holders.
- H. A maximum of two substitution requests shall be reviewed for any single fixture type. If a substitution has not been approved following this process, the Contractor shall provide the specified fixture.

1.7 CUSTOM LIGHT FIXTURES

- A. All custom light fixtures require a prototype to be submitted prior to commencement of fabrication. The purpose of the prototype will be to review construction, lamp placement within the fixture, lamp type, optical assembly, finishes, etc. Modifications may be required as a result of the prototype review. These modifications and others that do not materially affect the cost of the fixture shall be incorporated at no additional cost to the Owner.

1.8 COORDINATION

- A. Coordinate layout and installation of light fixtures with ceiling system and other construction that penetrates ceilings or is supported by them including mechanical system, fire suppression, AV, and partition assemblies.
- B. Provide all frames, supplementary support structures, hangers, spacers, stems, aligner canopies, auxiliary junction boxes and other hardware as required for a complete and proper installation. Recessed fixtures shall have frames that are compatible with the ceiling systems.
- C. Coordination Meetings: Meet at least twice with the ceiling installer. Hold first meeting before submittal of shop drawings to coordinate each light fixture mounting condition with ceiling type. During second meeting, coordinate fixture layout in each area. Meet at least twice with the mechanical systems installer prior to fabrication and installation of ductwork. Coordinate depth and location of all light fixtures and ductwork in all areas.

1.9 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Warranties for Fluorescent Ballasts: Written warranty, executed by manufacturer agreeing to replace fluorescent ballasts that fail in materials or workmanship within specified warranty period.
 - 1. Special Warranty Period for Electronic Ballasts: Five years from date of manufacture, but not less than four years from date of Substantial Completion.
 - 2. Special Warranty Period for Electromagnetic Ballasts: Manufacturers' standard warranty, but not less than three years from date of manufacture.
- C. Special Warranty for Fluorescent Lamps: Manufacturer's standard form, made out to Owner and signed by lamp manufacturer agreeing to replace lamps that fail in materials or workmanship, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: Two years from date of Substantial Completion.

1.10 EXTRA MATERIALS

- A. Furnish extra materials described below that match product installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Lamps: One case or 10% (whichever is less) of each type and rating installed on the project. Furnish at least one of each type.
 2. Glass and Plastic Lenses, Covers, Louvers, and Other Optical Parts: 10% or one dozen (whichever is less) of each type and rating installed. Furnish at least one of each type.
 3. Ballasts: One case or 10% (whichever is less) of each type and rating installed. Furnish at least one of each type.
 4. Globes and Guards: 5% of each type and rating installed. Furnish at least one of each type.
 5. Fuses: One case or 10% (whichever is less) of each type and rating installed on the project. Furnish at least one of each type.
 6. Adjustable Accent Lights (track, recessed, or surface mounted): One case or 20% (whichever is less) of each lamp type. A spot distribution and a flood distribution lamp are considered to be two different lamp types. 10% or one dozen (whichever is less) additional lenses, color filters, louvers, and other accessories to be used during final focusing.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Catalog series numbers specified on the plans represent the type and style of fixture. The fixture size shall correspond with the wattage indicated or the actual length of the fixture as indicated on the drawings.
- B. Numbers are a design series reference and do not necessarily represent the exact catalog number, size, voltage, wattage, type of lamp, type of ballast, finish trim, ceiling type, mounting hardware or special requirements as specified as required by the particular installations. Acceptable manufacturers and series numbers are listed. The manufacturer listed shall provide complete fixtures equaling or exceeding the written specifications. Verify these requirements and order fixtures as required for a complete and fully operational installation per the contract documents and per code.

2.2 GENERAL MATERIAL REQUIREMENTS

- A. Fixtures shall be free of light leaks while providing sufficient ventilation of lamps to provide the required photometric performance. Ballasts and transformers shall be adequately vented.
- B. Lampholders shall hold lamps securely against normal vibration and maintenance handling.
- C. Light fixtures containing lamps which require protective shielding shall be furnished with a tempered glass lens or approved unbreakable lens UL listed for the application.
- D. Metal Parts shall be free from burrs, sharp corners, and edges. Metal work shall be free from tool marks and dents and shall have accurate angles bent as sharply as compatible

with the gauges of the required metal. Intersections and joints shall be formed true and of adequate strength and structural rigidity to prevent any distortion after assembly. All miters shall be in accurate alignment with abutting intersection members.

- E. Sheet Metal Components shall be steel, unless otherwise indicated. Components shall be formed and supported to prevent warping and sagging. Luminaires to be painted after fabrication. Finish ferrous mounting hardware and accessories to prevent corrosion and discoloration to adjacent materials.
- F. Fixture hardware to comply with the following material standards: For steel and aluminum fixtures, all screws, bolts, nuts and other fastening and latching hardware shall be cadmium or equivalent plated. For stainless steel fixtures, all hardware shall be stainless steel. For bronze fixtures, all hardware shall be stainless steel or bronze.
- G. Doors, Frames, and other internal access shall be smooth operating, free from light leaks under normal operating conditions, and designed to permit relamping without use of tools.
- H. Provide supplemental safety device or arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during relamping and when secured in operating position. Safety devices shall be detachable if necessary and shall not interfere with fixture performance, maintenance, or the seating of any fixture element. Safety device shall not be visible during normal fixture operation and from normal viewing angles.
- I. Reflecting Surfaces: Minimum reflectance as follows, unless otherwise indicated:
 - 1. White Surfaces: 85 %.
 - 2. Specular Surfaces: 90 %.
 - 3. Diffusing Specular Surfaces: 75 %.
 - 4. Laminated Silver Metalized Film: 90 %.
- J. Reflector cones shall adhere to the following criteria:
 - 1. Cones designed for vertically mounted lamps shall provide a minimum of 45 degree cutoff of lamp and lamp image. Cones designed for horizontally mounted lamps shall provide a minimum of 55 degree cutoff of lamp and lamp image. There shall be no visible lamp flashing in the cone.
 - 2. Plastic material shall not be used for reflector cones, unless otherwise specified.
 - 3. Cones shall not be permanently fastened to the housing or ceiling and shall be removable without tools. Retention devices shall not deform the cone or be visible from normal viewing angles.
 - 4. Trim shall be flush to the finished ceiling without gaps or light leaks. Where the flange trim is separate from the cone, it shall have the same finish as the reflector cone.
 - 5. Reflector cones shall be of uniform gauge, not less than 0.032" thick, high purity aluminum Alcoa 3002 alloy. Cones shall be free of spin marks or other defects.
 - 6. Manufacture cone using the Alzak process. Refer to the fixture schedule for cone color and finish (i.e. Specular or diffuse) requirements. For compact fluorescent fixtures, finish shall eliminate iridescence.
- K. Lenses, Diffusers, Covers, and Globes shall be 100 % virgin acrylic plastic or annealed crystal glass, unless otherwise indicated.
 - 1. Plastic, polycarbonate and acrylic shall be UV stabilized and shall have high resistance to yellowing and other changes due to aging, exposure to heat and ultraviolet radiation.
 - 2. Lens thickness shall be 0.125" (3 mm) unless other thickness is indicated.
 - 3. Lenses shall have uniform brightness throughout the entire visible area.

4. Provide lens thickness of 0.15" (3.8 mm) and inverted prismatic lenses for ease of cleaning within the following locations:
 - a. Nurseries
 - b. Central Sterilizing Rooms
 - c. Treatment Rooms
 - d. Surgical Suites
 - e. Intensive Care Units
 - f. Recovery Rooms
 - g. Obstetrical Suites
 - h. Emergency Rooms
 - i. Laboratories

- L. Adjustable light fixtures shall have positive locking devices to fix the aiming angle. Fixtures shall be capable of being re-lamped without adjusting the aiming angle.

- M. Each lighting fixture that has a lamp with an oval shape beam pattern or a spread lens that defines beam orientation shall contain lamp or lens locking devices to insure that lamp or lens orientation is not disturbed during future lamp replacement or cleaning.

- N. All fixtures and ballasts must operate within the temperature limits of their design and as specified by Underwriters' Laboratories, Inc. in the applications and mounting conditions herein specified.

- O. Fixtures recessed in suspended ceilings where the space above the ceiling is either an air supply or return plenum shall conform to NEC Article 300-22.

- P. Provide plaster frame for recessed light fixtures mounted in other than T-bar ceilings. Verify mounting with architectural reflected ceiling plan before ordering light fixtures.

- Q. Provide wire guards on all fluorescent open strip type fixtures.

- R. Fixtures for use outdoors or in areas designated as damp locations shall be suitably gasketed to prevent the entrance of moisture. Provide approved wire mesh screens for ventilation openings. Dissimilar metals shall be separated by non-conductive material to prevent galvanic action.

- S. Welding shall be done with electrodes and/or methods recommended by the manufacturers of the metals being welded. Welds shall be continuous, except where spot welding is specifically permitted. Welds exposed to view shall be ground flush and dressed smooth. All welds on or behind surfaces which will be exposed to view shall be done so that finished surface will be free of imperfections such as pits, runs, splatter, cracks, warping, dimpling, depressions or other forms of distortion or discoloration. Remove weld spatter and welding oxides from all welded surfaces.

- T. Electromagnetic-Interference Filters shall be factory installed to suppress conducted electromagnetic-interference as required by MIL-STD-461E. Fabricate light fixtures with one filter on each ballast indicated to require a filter.

2.3 FLUORESCENT FIXTURES

- A. Housing shall be minimum code gauge steel or rigid aluminum construction painted after fabrication with high reflectance white paint unless otherwise indicated in Light Fixture Details.

- B. Shielding shall adhere to the following criteria:

1. Egg crate louvers shall be aluminum, continuously bound in a perimeter channel frame. Frame, louver, and support shall be painted to a finish as selected by Architect.
 2. Parabolic louvers shall be Alzak aluminum with a low iridescent finish, specular, semi-specular, or American Matte as indicated on the drawings
 3. Flat translucent diffuser shall be 100% virgin acrylic and shall have matte finish on exterior side. Diffuser shall be of sufficient density to completely obscure lamp image.
 4. Flat clear lenses shall be injection molded 100% virgin acrylic or clear tempered glass, thickness as specified on the drawings
 5. Clear patterned lenses shall be injection molded 100% virgin acrylic. For lenses with convex pattern of prisms or cones, specified minimum thickness refers to distance from the flat surface to the base of the pyramids or cones, or to the thickness of undisturbed material. For lenses with concave pattern, specified minimum thickness refers to overall thickness of the material. Lenses shall fully eliminate lamp image when viewed from all directions between 45-90 degrees from vertical. From 0-45 degrees the ratio of maximum brightness to minimum brightness shall not exceed 3:1. Minimum thickness shall not be less than 0.125" with a minimum weight of 8 ounces per square foot.
 6. Parawedge louvers shall be injection molded plastic with specular silver anti-static finish. Cell dimensions shall be ½" x ½" x ½".
- C. Doorframes shall be supplied with concealed hinges and latching. Provide mitered corners with no gaps or light leaks.
- D. Lamp mounting shall adhere to the following criteria:
1. Lamps used in rapid start circuits 430 ma and below shall be mounted within ½" of grounded metal of equal length to the lamp. For lamps operating at 800 ma and 1500 ma, mount within 1" of grounded metal of equal length to the lamp.
 2. Provide one grounding lamp holder per lamp for rapid start circuits using single lamp ballasts.

2.4 FLUORESCENT LAMP BALLASTS

- A. General Requirements: Provide lamp-ballast systems approved by the manufacturer to maximize lamp performance and to qualify for manufacturer's extended lamp and ballast warranties. Unless otherwise indicated, provide products manufactured by one of the following; Osram/Sylvania, Magnetek, or Advance, with features that include the following:
1. Ballasts shall be Instant Start, Rapid Start or Programmed Start technology, depending on location and application.
 2. Life: Ballasts shall provide normal rated lamp life as stated by lamp manufacturers.
 3. Electronic integrated circuit, solid-state, full-light-output, energy efficient type, compatible with lamps and lamp quantities specified.
 4. Certifications: Underwriters Laboratories (UL) listed Class P, Certified Ballast Manufacturer (CBM), and Electrical Testing Laboratory (ETL).
 5. Comply with ANSI C82.11
 6. Operating voltage: shall match voltage of circuit. Confirm voltage requirements with Electrical Drawings. Ballasts shall operate lamps correctly within 10% voltage variation without damaging ballasts.
 7. Operating Frequency: 60 Hz at voltage of circuit indicated on drawings.
 8. Lamp Operating Frequency: 20 kHz or higher.
 9. Flicker: Ballasts shall operate lamps with no visible flicker.
 10. Power Factor: 0.95 or higher.
 11. Total Harmonic Distortion Rating: Less than 10%.

12. Ballast Factor: 0.85 or higher, or, as specified on drawings
13. Lamp Current Crest Factor: 1.7 or less.
14. Sound Ratings:
 - a. A for 430 ma and 265 ma
 - b. B for 800 ma
 - c. C for 1500 ma
15. Parallel Lamp Circuits: Multiple lamp ballasts shall comply with ANSI C82.11 and shall be connected to maintain full light output on surviving lamps if one or more lamps fail.
16. Transient Protection: Comply with IEEE C62.41, Category A or better.
17. Interference: Comply with 47 CFR, Chapter 1, Part 18, and Subpart C for limitations on electromagnetic and radio-frequency interference for non-consumer equipment.
18. Operating Temperatures: Ballasts shall operate in ambient temperatures up to 105 degrees Fahrenheit (40 degrees Celsius) and shall have thermal protection.
19. Compact fluorescent lamp end of life detection and shutdown circuit.
20. Automatic lamp starting after lamp replacement.
21. Single Ballasts for Multiple Lighting Fixtures: Factory wired with ballast arrangements and bundled extension wiring to suit final installation condition without modification or rewiring in the field.
22. Utility Funding: Ballasts shall meet utility requirements for projects which are applying for utility rebates or funding.

2.5 HIGH INTENSITY DISCHARGE (HID) FIXTURES

- A. Housing shall be minimum code gauge steel or rigid aluminum construction painted after fabrication with high reflectance white paint. Steel housing shall be bonderized or otherwise rust protected.
- B. Concealed parts of fixture such as lamp holders, yokes, accessory holders, and housing shall be matte black finish. Visible surfaces shall be powder coated paint unless otherwise specified. Color and finish to be selected by Architect.
- C. Lamp holder housing shall be cast aluminum with integral heat radiating fins to insure cool lamp base operation.
- D. Fixtures which will not accommodate open fixture rated lamps shall have clear tempered glass lenses.

2.6 HIGH INTENSITY DISCHARGE (HID) BALLASTS

- A. General Requirements: Unless otherwise indicated, provide products manufactured by one of the following: Advance, Holophane, or Aromat. Provide electronic metal halide ballasts for all metal halide fixtures utilizing ceramic metal halide lamps of 150W or less.
- B. Metal Halide Electronic Ballasts shall include the following features:
 1. Lamp end of life detection and shutdown circuit.
 2. Sound Rating: A
 3. Total Harmonic Distortion Rating: Less than 15%.
 4. Transient Voltage Protection: IEEE C62.41, Category A or better.
 5. Lamp current Crest Factor: 1.5 or less.
 6. Power Factor: 0.90 or higher.
 7. Interference: Comply with 47 CFR, Chapter 1, Part 18, Subpart C, for limitations on electromagnetic and radio-frequency interference for non-consumer equipment.
 8. Protection: Class P thermal cutout.

9. Retain subparagraph and associated subparagraphs below for bi-level ballasts.
- C. Metal Halide Electromagnetic Ballasts shall include the following features:
1. Operating voltage: Match voltage of circuit. Confirm voltage requirements with Electrical Drawings.
 2. Comply with ANSI 82.4.
 3. Type: Constant wattage autotransformer or regulating high-power-factor type, except for metal halide lamps below 175 watts without igniters where high resistance auto transformer type is acceptable.
 4. Minimum Starting Temperature: Minus 22 degrees Fahrenheit (minus 30 degrees Celsius) for single lamp ballasts.
 5. Normal Ambient Operating Temperature: 104 degrees Fahrenheit (40 degrees Celsius).
 6. High Power Factor: 90% minimum.
 7. Open circuit operation that will not reduce average life.
 8. Each ballast shall be individually protected by an in-line fuse in a Bussman fuseholder type HLR for 120V and 277V, type HEX for 208V, 240V, and 480V.
 9. Encapsulation: Manufacturer's standard epoxy-encapsulated model designed to minimize audible fixture noise. Ballast shall be rated "low noise" or "extra quiet".

2.7 LAMPS

- A. Provide products manufactured by one of the following: Osram/Sylvania, General Electric, Philips, Ushio, Venture, or approved equal.
- B. Provide lamp-ballast systems approved by the manufacturer to maximize lamp performance and to qualify for manufacturer's extended lamp and ballast warranties. All lamps of the same type are to be provided by the same manufacturer.
- C. Lamp each fixture with the proper quantity of lamps of the type specified.
- D. Fluorescent Lamps:
 1. All fluorescent lamps shall be low mercury California non-hazardous TCLP compliant lamps.
 2. Correlated Color Temperature: 3500 K unless otherwise indicated in the Light Fixture Details
 3. Minimum Color-Rendering Index: 85 CRI unless otherwise indicated in the Light Fixture Details.
 4. Fluorescent Lamps provided are required to have passed the latest Federal TCLP testing.
 5. Seasoning: Lamps used in dimmable fixtures shall be seasoned after installation by operating lamps at full output for approximately 100 hours without turning off.
 6. Comply with EPA's toxicity characteristic leaching procedure test; shall yield less than 0.1 mg of mercury per liter when tested according to NEMA LL 1.
- E. High Intensity Discharge (HID) Lamps
 1. Metal halide lamps used in interior applications shall be ceramic metal halide for wattages that do not have ceramic metal halide technology, provide phosphor coated, color corrected lamps with a minimum CRI of 80.
 2. Metal halide lamps used in exterior applications shall be clear lamps, unless otherwise noted.
 3. Seasoning: HID lamps shall be seasoned after installation by operating the lamps for 100 hours without turning off.
 4. Mercury vapor lamps are not acceptable.

2.8 SOCKETS

- A. Fluorescent sockets shall be suitable for lamp and ballast type specified.
- B. HID sockets shall be porcelain for mogul or medium base lamps, pulse rated as required. Sockets shall be keyed for all position oriented lamps. For other lamp types as required by base type.

2.9 WIRING

- A. All wiring shall be as required by code for fixture wiring.
- B. All flexible cord wiring between fixture components or to electrical receptacles and not in wireways shall have a minimum temperature rating of 105 degrees Celsius.
- C. Cords shall be fitted with proper strain reliefs and watertight entries where required by application.
- D. No internal wiring shall be visible at normal viewing angles.
- E. For Master/Slave fixtures: Supply ballasts in adjacent fixtures to operate one or more lamps in the adjacent fixtures where required on Electrical Drawings. For single lamp fixtures, provide a two-lamp ballast for two adjacent fixtures. For three-lamp fixtures, provide one two-lamp ballast for the outboard lamps in each fixture and an additional two-lamp ballast for the center lamp in each of two adjacent fixtures.
- F. For Tandem Wired fixtures in continuous rows, and where required on Electrical Drawings, supply ballasts and wiring to control all inboard lamps together and all outboard lamps together.
- G. Provide #18 AWG, 3 wire flexible conduit connections (whips) for dual level switching as shown on Electrical Drawings for light fixtures recessed in accessible suspended ceiling. Provide 3-wire whips for all dual level switching. Wire count on wire whips is not shown on Drawings and shall be the responsibility of the Contractor to provide proper wire count for the lighting control as shown on Drawings.

2.10 FIXTURE SUPPORT COMPONENTS

- A. Comply with Section pertaining to General Electrical Provisions, paragraph entitled Equipment anchorage, Support, Seismic Restraint, and Bracing for fixture support and bracing.
- B. Where the ceiling is of insufficient strength to support the weight of the lighting fixtures, provide additional framing from building structure to support luminaires as required. Do not support fixtures from ceiling T-Bar system.
- C. Single-Stem Hangers shall be 1/2-inch steel tubing with swivel ball fitting and ceiling canopy. Finish shall be the same as the luminaire.
- D. Twin-Stem Hangers shall be two, 1/2-inch steel tubes with single canopy arranged to mount a single fixture. Finish shall be the same as the luminaire.
- E. Rod Hangers shall be 3/16-inch minimum diameter, cadmium-plated threaded steel rod.
- F. Wires shall be ASTM A 641/A 641M, Class 3, soft temper, zinc coated steel, 12 gauge.

- G. Wires for humid spaces shall be ASTM A 580/A 580M, composition 302 or 304, annealed stainless steel, 12 gauge.
- H. Hook Hangers shall be integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.
- I. Aircraft Cable Support shall use cable, anchorages, and intermediate supports recommended by fixture manufacturer.
- J. Hangers for Pendant Industrial Fixtures shall be heavy duty No. 8 jack chain with hangers, "S" hooks, mounting. Straps, and all required accessories for complete installation.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install suspended luminaires using pendants supported from swivel hangers. Install pendant length required to suspend luminaire at indicated height.
- B. Support luminaires larger than 2 x 4 foot size independent of ceiling framing.
- C. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
- D. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- E. Exposed Grid Ceilings: Support surface-mounted luminaires on grid ceiling directly from building structure.
- F. Install recessed luminaires to permit removal from below.
- G. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
- H. Install clips to secure recessed grid-supported luminaires in place.
- I. Install wall-mounted luminaires at height as indicated on Drawings.
- J. Install accessories furnished with each luminaire.
- K. Connect luminaires to branch circuit outlets provided under Division 26 as indicated on Drawings.
- L. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- M. Install specified lamps in each luminaire.
- N. Interface with air handling accessories furnished and installed under Division 23.
- O. Ground and bond interior luminaires in accordance with Division 26.

- P. Fixtures: Set level, plumb, and square with ceiling and walls, and secure according to manufacturer's written instructions and approved submittal materials. Install lamps in each fixture.
- Q. Mounting height indicated in drawings from finished floor to bottom of pendant light fixture or to the center of the outlet box for wall mounted light fixtures unless otherwise noted. Verify mounting heights with Architect and Lighting Designer.
- R. Mounting height may also be indicated as the length of the pendant below finished ceiling.
- S. Provide all necessary hanging or mounting devices and accessories for all fixtures. Verify the types needed for various ceiling conditions. Plaster rings shall be provided where required.
- T. Verify weight and mounting method of all fixtures prior to ordering and provide suitable support. Coordinate with General Contractor for fixtures that require additional blocking or support. Fixture mounting assemblies shall comply with all local seismic codes and regulations.
- U. Refer to architectural reflected ceiling plans for coordination of light fixture locations with mechanical and fire safety equipment. Where conflicts occur, coordinate with Architect and Lighting Designer prior to installing any of the systems.
- V. In accessible suspended ceilings, fixture wiring connection, including equipment grounding conductor, is to be through use of 72-inch flexible conduit from a rigidly supported junction box.
- W. Wire per requirements of branch circuit installation. Properly ground each fixture.
- X. Light fixtures located in recessed ceilings with a fire resistive rating of 1 hour or more shall be enclosed in an approved fire resistive rated box equal to that of the ceiling.
- Y. Install fixtures with vent holes free of air blocking obstacles.
- Z. Contractor shall be responsible for adjusting aperture flanges or rings on all recessed fixtures to be flush with the finished ceiling. Fixture trim shall completely conceal ceiling opening.
- AA. Adjust variable position lampholders for proper lamp position prior to fixture installation.

3.2 FIXTURE SUPPORT

- A. Comply with specifications section describing General Electrical Provisions, paragraph entitled Equipment Anchorage, Support, Seismic Restraint, and Bracing for fixture support and bracing.
- B. Provide all necessary hanging or mounting devices for all fixtures, verify the type needed for various ceiling conditions. Plaster rings shall be provided where required.
- C. Ceiling Fixture Support: Where ceiling is of insufficient strength to support weight of light fixtures installed, provide additional framing from building structure to support as required.

- D. Provide two slack No. 9 safety wire hangers or threaded rods for each recessed mounted fluorescent fixture. Secure from opposite corners of each fixture and fasten to structure above, independent of ceiling system. Locate supports not more than 6 inches from fixture corners.
- E. Electrical Contractor is to provide and install locking clips for all fixtures installed in suspended ceilings. The locking clip is to be attached to the fixture with a sheet metal screw or similar device and secured to the main or supporting T-bar runner to guarantee a secure installation. Clips shall be located at or near fixture corners.
- F. Fixtures which are of a size smaller than the ceiling grid shall be located as indicated on the reflected ceiling plans. Fixtures shall be supported independently of the grid ceiling with at least two ¾ inch metal channels spanning and secured to the ceiling tees.
- G. Metal decking shall not be pierced for luminaire support.
- H. Where pendants or rods are longer than 48 inches, brace to limit luminaire swinging.
- I. Brace suspended luminaires installed near ducts or other elements so that they do not swing into obstructions.
- J. Wall mounted light fixtures shall be supported from four-square outlet box plaster ring and from wall at non-feed end with two 1/4-inch toggle bolts for gypsum board walls or 1/4-inch bolts to pre-set inserts for concrete wall.

3.3 COMPACT FLUORESCENT FIXTURES

- A. Install as for incandescent fixture, except where special provisions are required for ballast arrangement; provide access to ballasts in all cases.

3.4 FLUORESCENT FIXTURES

- A. Recessed Type: Support fixtures independent of the ceiling suspension system. Provide four integral tabs (one at each corner) which rotate into position and lock on ceiling tees after fixture is lifted into the ceiling cavity or provide four clips similar to Caddy #535. Provide mounting frames suitable for the ceiling type. In addition, provide slack earthquake safety wire hangers secured diagonally from opposite fixture corners to structural members above suspended ceiling. Comply with Authority Having Jurisdiction.
- B. Wall Mounted Type: Support from four-square outlet box plaster ring and from wall at non-feed end with two 1/4 inch toggle bolts for gypsum board walls or ¼ inch bolts to pre-set inserts for concrete wall.
- C. Fluorescent lighting fixtures shall be switched as shown on electrical drawings. Four-lamp fixtures shown with 2-level switching shall be wired with lamps, 1, 4 and 2, 3 each on separate switch-legs for 2-level switching. Three-lamp fixtures shown with 2-level switching shall be wired with lamps, 1, 3 and 2 each on separate switch-legs for 2-level switching.
- D. If clearance above T-bar system is too restricted to "tip-in" fixture, coordinate with acoustic ceiling installer by leaving one cross T-bar off until the cross T-bar shall be secured into its proper place. Fluorescent fixtures installed in hidden spline type ceilings shall have supporting channels installed by Ceiling Contractor to adequately support the fixture without providing additional hangers from the structural ceiling above the suspended ceiling.

- E. Install air handling light fixtures with dampers closed and ready for adjustment.
- F. Surface Mounted Type:
 1. Where mounted on accessible ceilings, support from structural members above ceiling by means of hanger rods through ceiling or as approved.
 2. Continuous Runs of Fixtures: Laser sight to insure fixtures are straight and true when sighting from end to end, regardless of irregularities in the ceiling. Where light fixtures are so installed, omit ornamental ends between sections.
- G. Pendant Mounted Type:
 1. Provide strong back channel entire fixture length unless light fixture is designed specifically to be self-supporting.
 2. Where suspended below accessible ceiling, provide structural support at suspended ceiling level from structural members above ceiling. Do not run hanger rods through ceiling.
 3. Continuous Runs of Light Fixtures: Laser sight to insure fixtures are straight and true when sighting from end to end, regardless of irregularities in the ceiling. Where light fixtures are so installed, omit ornamental ends between sections.
- H. Install lighting fixture diffusers only after construction work, painting and clean up are completed.

3.5 HIGH INTENSITY DISCHARGE FIXTURES

- A. Install as for incandescent fixture, except where special provisions are required for ballast arrangement; provide access to ballasts in all cases.
- B. Provide an earthquake chain as noted above for each fixture when fixture is supported by the ceiling suspension system. Provide two chains for units larger than 250 watts or 12" x 24" in dimension.
- C. For fixtures with remote ballasts, isolate ballast from the structure.

3.6 LIGHTING CONTROL

- A. Provide branch circuiting in coordination with lighting control requirements of specification section describing Lighting Control Equipment and as indicated on Electrical Drawings.

3.7 CLEANING AND ADJUSTING

- A. Remove protective plastic covers from light fixtures and fixture diffusers only after construction work, painting and clean-up are completed. Remove, clean, and reinstall all dirty lamps, reflectors and diffusers.
- B. Clean fixtures internally and externally after installation. Use methods and materials recommended by manufacturer for cleaning Alzak reflectors and other surfaces.
- C. Make final adjustment of aimable light fixtures and adjustable light settings under the direction of the Lighting Designer during a scheduled period of time prior to the completion of the project, after normal business hours if required. Include all equipment and personnel expenses including overtime required for focusing.
- D. Fixtures, reflectors, and accessories which are damaged, blemished, or impregnated with fingerprints shall be replaced at the contractor's expense. All finishes shall be unmarred upon project completion.

3.8 FIELD QUALITY CONTROL

- A. Coordinate all testing procedures and schedule with the specification section describing Commissioning Agent – Demonstration and Training. All testing is to be documented with test procedures, results and initials of witnessing personnel and submitted to Commissioning Agent.
- B. Coordinate inspection and testing of Lighting Fixtures with specification section describing – Lighting Control Equipment.
- C. Inspect each installed fixture for damage. Replace damaged fixtures and components.
- D. Replace all burned out lamps or inoperative lamps at the end of construction prior to Owner occupancy.
- E. Advance Notice: Give dates and times for field tests.
- F. Provide instruments to make and record test results. Verify that instruments are within the required accuracy range for the tests performed.
- G. Test as follows:
 - 1. Verify proper operation, switching and phasing of each fixture after installation.
 - 2. Emergency Lighting: Interrupt electrical supply to demonstrate proper operation. Verify normal transfer to generator and retransfer to normal.
 - 3. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to the lighting system, retest to demonstrate compliance with standards.
- H. Malfunctioning Fixtures and Components: Replace or repair, then retest. Repeat procedure until units operate properly.

END OF SECTION

SECTION 26 56 00
EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes exterior luminaires, poles, and accessories.

1.02 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Exterior Luminaire:
1. Basis of Measurement: Each.
 2. Basis of Payment: Includes concrete base, luminaire pole, and luminaire with lamps and accessories.

1.03 REFERENCES

- A. American National Standards Institute:
1. ANSI C82.1 - American National Standard for Lamp Ballast-Line Frequency Fluorescent Lamp Ballast.
 2. ANSI C82.4 - American National Standard for Ballasts-for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type).
 3. ANSI O5.1 - Wood Poles, Specifications and Dimensions.

1.04 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures {01330 - Submittal Procedures}: Submittal procedures.
- B. Shop Drawings: Indicate dimensions and components for each luminaire not standard Product of manufacturer.
- C. Product Data: Submit dimensions, ratings, and performance data.
- D. Samples: Submit two color chips 3 x 3 inch (75 x 75 mm) in size illustrating luminaire finish color where indicated in luminaire schedule.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years [documented] experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements {01600 - Product Requirements}: Product storage and handling requirements.
- B. Store and handle solid wood poles in accordance with ANSI O5.1.

1.07 COORDINATION

- A. Section 01 30 00 - Administrative Requirements 01300 - Administrative Requirements: Coordination and project conditions.
- B. Furnish bolt templates and pole mounting accessories to installer of pole foundations.

1.08 MAINTENANCE MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements 01700 - Execution Requirements: Spare parts and maintenance products.
- B. Furnish two of each lamp installed.
- C. Furnish two gallons of touch-up paint for each different painted finish and color.
- D. Furnish two ballasts of each lamp type installed.

PART 2 PRODUCTS

2.01 LUMINAIRES

- A. Product Description: Complete exterior luminaire assemblies, with features, options, and accessories as scheduled.
- B. Refer to Section 01 60 00 - Product Requirements 01600 - Product Requirements.

2.02 LAMPS - GENERAL

- A. Minimum Efficacy, Lamps Greater Than 100 Watts: 60 lumens/W, except where otherwise indicated or permitted by applicable code.

2.03 LED LAMPS

- A. Manufacturers:
 - 1. Cree.
 - 2. Philips Electronics North America.
 - 3. Substitutions: Section 01 60 00 - Product Requirements.

2.04 METAL POLES

- A. Manufacturers: Match existing.
 - 1. Substitutions: Section 01 60 00 - Product Requirements.
- B. Material and Finish: Steel with prime finish for field painting. Match existing pole.
- C. Height: As indicated on Drawings. Match existing pole.
- D. Base: Match existing pole

PART 3 EXECUTION

3.01 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and Project conditions.
- B. Verify foundations are ready to receive fixtures.

3.02 EXISTING WORK

- A. Disconnect and remove abandoned exterior luminaries.
- B. Extend existing exterior luminaire installations using materials and methods [compatible with existing installations, or] as specified.
- C. Clean and repair existing exterior luminaries to remain or to be reinstalled.

3.03 INSTALLATION

- A. Install concrete bases for lighting poles at locations as indicated on Drawings, in accordance with Section 03 30 00.
- B. Install poles plumb. Install shims to adjust plumb. Grout around each base.
- C. Install lamps in each luminaire.
- D. Bond and ground luminaries, metal accessories and metal poles in accordance with Section 26 05 26. Install supplementary grounding electrode at each pole.

3.04 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Operate each luminaire after installation and connection. Inspect for improper connections and operation.
- C. Measure illumination levels.
- D. Take measurements during night sky, without moon or with heavy overcast clouds effectively obscuring moon.

3.05 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Aim and adjust luminaries to provide illumination levels and distribution.

3.06 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Clean photometric control surfaces as recommended by manufacturer.
- C. Clean finishes and touch up damage.

3.07 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.
- B. Relamp luminaries having failed lamps at Substantial Completion.

END OF SECTION

SECTION 27 05 26

GROUNDING AND BONDING FOR COMMUNICATIONS 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. Grounding conductors.
 - 2. Grounding connectors.
 - 3. Grounding busbars.
 - 4. Grounding rods.
 - 5. Grounding labeling.

1.3 DEFINITIONS

- A. BCT: Bonding conductor for telecommunications.
- B. EMT: Electrical metallic tubing.
- C. TGB: Telecommunications grounding busbar.
- D. TMGB: Telecommunications main grounding busbar.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For communications equipment room signal reference grid. Include plans, elevations, sections, details, and attachments to other work.

1.5 INFORMATIONAL SUBMITTALS

- A. As-Built Data: Plans showing as-built locations of grounding and bonding infrastructure, including the following:
 - 1. Ground rods.
 - 2. Ground and roof rings.
 - 3. BCT, TMGB, TGBs, and routing of their bonding conductors.

- B. Qualification Data: For Installer, installation supervisor, and field inspector.
- C. Qualification Data: For testing agency and testing agency's field supervisor.
- D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in Division 01, include the following:
 - a. Result of the ground-resistance test, measured at the point of BCT connection.
 - b. Result of the bonding-resistance test at each TGB and its nearest grounding electrode.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
 - 1. Installation Supervision: Installation shall be under the direct supervision of ITS Technician, who shall be present at all times when Work of this Section is performed at Project site.
 - 2. Field Inspector: Currently registered by BICSI as a registered communications distribution designer to perform the on-site inspection.

PART 2 - PRODUCTS

2.1 SYSTEM COMPONENTS

- A. Comply with J-STD-607-A.

2.2 CONDUCTORS

- 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. Harger Lightning and Grounding.
 - 2. Panduit Corp.
 - 3. Tyco Electronics Corp.
 - 4. Or equal.
- B. Comply with UL 486A-486B.

- C. Insulated Conductors: Stranded copper wire, green or green with yellow stripe insulation, insulated for 600 V, and complying with UL 83.
 - 1. Ground wire for custom-length equipment ground jumpers shall be No. 6 AWG, 19-strand, UL-listed, Type THHN wire.
 - 2. Cable Tray Equipment Grounding Wire: No. 8 AWG.
- D. Cable Tray Grounding Jumper:
 - 1. Not smaller than No. 10 AWG and not longer than 12 inches (300 mm). If jumper is a wire, it shall have a crimped grounding lug with one hole and standard barrel for one crimp. If jumper is a flexible braid, it shall have a one- or two-hole ferrule. Attach with grounding screw or connector provided by cable tray manufacturer.
- E. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Bonding Cable: 28 kcmils (14.2 sq. mm), 14 strands of No. 17 AWG conductor, and 1/4 inch (6.3 mm) in diameter.
 - 4. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 5. Bonding Jumper: Tinned-copper tape, braided conductors terminated with two-hole copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.3 CONNECTORS

- A. Irreversible connectors listed for the purpose. Listed by an NRTL as complying with NFPA 70 for specific types, sizes, and combinations of conductors and other items connected. Comply with UL 486A-486B.
- B. 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. [Burndy; Part of Hubbell Electrical Systems.](#)
 - 2. [Chatsworth Products, Inc.](#)
 - 3. [Harger Lightning and Grounding.](#)
 - 4. [Panduit Corp.](#)
 - 5. [Tyco Electronics Corp.](#)
 - 6. Or equal.
- C. Compression Wire Connectors: Crimp-and-compress connectors that bond to the conductor when the connector is compressed around the conductor. Comply with UL467.
 - 1. Electroplated tinned copper, C and H shaped.
- D. Busbar Connectors: Cast silicon bronze, solderless exothermic-type, mechanical connector; with a long barrel and two holes spaced on 5/8- or 1-inch (15.8- or 25.4-mm) centers for a two-bolt connection to the busbar.
- E. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.4 GROUNDING BUSBARS

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. Chatsworth Products, Inc.
2. Harger Lightning and Grounding.
3. Panduit Corp.
4. Or equal.

B. **TMGB:** Predrilled, wall-mounted, rectangular bars of hard-drawn solid copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, length as indicated on Drawings. The busbar shall be NRTL listed for use as TMGB and shall comply with J-STD-607-A.

1. Predrilling shall be with holes for use with lugs specified in this Section.
2. **Mounting Hardware:** Stand-off brackets that provide a 4-inch ((100-mm)) clearance to access the rear of the busbar. Brackets and bolts shall be stainless steel.
3. Stand-off insulators for mounting shall be Lexan or PVC. Comply with UL 891 for use in 600-V switchboards, impulse tested at 5000 V.

C. **TGB:** Predrilled rectangular bars of hard-drawn solid copper, 1/4 by 2 inches (6.3 by 50 mm) in cross section, length as indicated on Drawings. The busbar shall be for wall mounting, shall be NRTL listed as complying with UL 467, and shall comply with J-STD-607-A.

1. Predrilling shall be with holes for use with lugs specified in this Section.
2. **Mounting Hardware:** Stand-off brackets that provide at least a 2-inch ((50-mm)) clearance to access the rear of the busbar. Brackets and bolts shall be stainless steel.)
3. Stand-off insulators for mounting shall be Lexan or PVC. Comply with UL 891 for use in 600-V switchboards, impulse tested at 5000 V.

D. **Rack and Cabinet Grounding Busbars:** Rectangular bars of hard-drawn solid copper, accepting conductors ranging from No. 14 to No. 2/0 AWG, NRTL listed as complying with UL 467, and complying with J-STD-607-A. Predrilling shall be with holes for use with lugs specified in this Section.

1. **Cabinet-Mounted Busbar:** Terminal block, with stainless-steel or copper-plated hardware for attachment to the cabinet.
2. **Rack-Mounted Horizontal Busbar:** Designed for mounting in 19- or 23-inch (483- or 584-mm) equipment racks. Include a copper splice bar for transitioning to an adjoining rack, and stainless-steel or copper-plated hardware for attachment to the rack.
3. **Rack-Mounted Vertical Busbar:** 72 or 36 inches ((1827 or 914 mm) long, with) stainless-steel or copper-plated hardware for attachment to the rack.

2.5 GROUND RODS

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. Harger Lightning and Grounding.
2. Tyco Electronics Corp.
3. Or equal.

- B. Ground Rods: Copper-clad steel, sectional type; 3/4 inch by 10 feet (19 mm by 3 m) in diameter.

2.6 LABELING

- 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. Brother International Corporation.
 - 2. HellermannTyton.
 - 3. Panduit Corp.
 - 4. Or equal.
- B. Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the ac grounding electrode system and equipment grounding for compliance with requirements for maximum ground-resistance level and other conditions affecting performance of grounding and bonding of the electrical system.
- B. Inspect the test results of the ac grounding system measured at the point of BCT connection.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with connection of the BCT only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Bonding shall include the ac utility power service entrance, the communications cable entrance, and the grounding electrode system. The bonding of these elements shall form a loop so that each element is connected to at least two others.
- B. Comply with NECA 1.
- C. Comply with J-STD-607-A.

3.3 APPLICATION

- A. Conductors: Install solid conductor for No. 8 AWG and smaller and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
 - 1. The bonding conductors between the TGB and structural steel of steel-frame buildings shall not be smaller than No. 6 AWG.
 - 2. The bonding conductors between the TMGB and structural steel of steel-frame buildings shall not be smaller than No. 6 AWG.
- B. Underground Grounding Conductors: Install bare copper conductor, No. 2 AWG minimum.
- C. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.
- D. Conductor Support:
 - 1. Secure grounding and bonding conductors at intervals of not less than 36 inches ((900 mm).)
- E. Grounding and Bonding Conductors:
 - 1. Install in the straightest and shortest route between the origination and termination point, and no longer than required. The bend radius shall not be smaller than eight times the diameter of the conductor. No one bend may exceed 90 degrees.
 - 2. Install without splices.
 - 3. Support at not more than 36-inch (900-mm) intervals.
 - 4. Install grounding and bonding conductors in 3/4-inch (21-mm) PVC conduit until conduit enters a telecommunications room. The grounding and bonding conductor pathway through a plenum shall be in EMT. Conductors shall not be installed in EMT unless otherwise indicated.
 - a. If a grounding and bonding conductor is installed in ferrous metallic conduit, bond the conductor to the conduit using a grounding bushing that complies with requirements in Section 270528 "Pathways for Communications Systems," and bond both ends of the conduit to a TGB.

3.4 GROUNDING ELECTRODE SYSTEM

- A. The BCT between the TMGB and the ac service equipment ground shall not be smaller than No. 1/0 AWG.

3.5 GROUNDING BUSBARS

- A. Indicate locations of grounding busbars on Drawings. Install busbars horizontally, on insulated spacers 2 inches (50 mm) minimum from wall, 12 inches (300 mm) above finished floor unless otherwise indicated.
- B. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.

3.6 CONNECTIONS

- A. Bond metallic equipment in a telecommunications equipment room to the grounding busbar in that room, using equipment grounding conductors not smaller than No. 6AWG.
- B. Stacking of conductors under a single bolt is not permitted when connecting to busbars.
- C. Assemble the wire connector to the conductor, complying with manufacturer's written instructions and as follows:
 - 1. Use crimping tool and the die specific to the connector.
 - 2. Pretwist the conductor.
 - 3. Apply an antioxidant compound to all bolted and compression connections.
- D. Primary Protector: Bond to the TMGB with insulated bonding conductor.
- E. Interconnections: Interconnect all TGBs with the TMGB with the telecommunications backbone conductor. If more than one TMGB is installed, interconnect TMGBs using the grounding equalizer conductor. The telecommunications backbone conductor and grounding equalizer conductor size shall not be less than 2 kcmils/linear foot (1 sq. mm/linear meter) of conductor length, up to a maximum size of No. 3/0 AWG 168 kcmils (85 sq. mm) unless otherwise indicated.
- F. Telecommunications Enclosures and Equipment Racks: Bond metallic components of enclosures to the telecommunications bonding and grounding system. Install vertically mounted rack grounding busbar unless the enclosure and rack are manufactured with the busbar. Bond the equipment grounding busbar to the TGB No. 2 AWG bonding conductors.
- G. Structural Steel: Where the structural steel of a steel frame building is readily accessible within the room or space, bond each TGB and TMGB to the vertical steel of the building frame.
- H. Electrical Power Panelboards: Where an electrical panelboard for telecommunications equipment is located in the same room or space, bond each TGB to the ground bar of the panelboard.
- I. Shielded Cable: Bond the shield of shielded cable to the TGB in communications rooms and spaces. Comply with TIA/EIA-568-B.1 and TIA/EIA-568-B.2 when grounding screened, balanced, twisted-pair cables.
- J. Rack- and Cabinet-Mounted Equipment: Bond powered equipment chassis to the cabinet or rack grounding bar. Power connection shall comply with NFPA 70; the equipment grounding conductor in the power cord of cord- and plug-connected equipment shall be considered as a supplement to bonding requirements in this Section.

3.7 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Duct-Bank Grounding Conductor: Bury 12 inches (300 mm) above duct bank when indicated as part of duct-bank installation.
- B. Comply with IEEE C2 grounding requirements.
- C. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches (100 mm) extends above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches (50 mm) above to 6 inches (150 mm) below concrete. Seal floor opening with waterproof, nonshrinkgrout.

3.8 IDENTIFICATION

- A. Labels shall be preprinted or computer-printed type.
 - 1. Label TMGB(s) with "fs-TMGB," where "fs" is the telecommunications space identifier for the space containing the TMGB.
 - 2. Label TGB(s) with "fs-TGB," where "fs" is the telecommunications space identifier for the space containing the TGB.
 - 3. Label the BCT and each telecommunications backbone conductor at its attachment point: "WARNING! TELECOMMUNICATIONS BONDING CONDUCTOR. DO NOT REMOVE OR DISCONNECT!"

3.9 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - 2. Test the bonding connections of the system using an ac earth ground-resistance tester, taking two-point bonding measurements in each telecommunications equipment room containing a TMGB and a TGB and using the process recommended by BICSI TDMM. Conduct tests with the facility in operation.
 - a. Measure the resistance between the busbar and the nearest available grounding electrode. The maximum acceptable value of this bonding resistance is 100 milliohms.
 - 3. Test for ground loop currents using a digital clamp-on ammeter, with a full-scale of not more than 10 A, displaying current in increments of 0.01 A at an accuracy of plus/minus 2.0 percent.
 - a. With the grounding infrastructure completed and the communications system electronics operating, measure the current in every conductor connected to the TMGB and in each TGB. Maximum acceptable ac current level is 1 A.

- C. Excessive Ground Resistance: If resistance to ground at the BCT exceeds 5 ohms, notify Architect and Resident Engineer promptly and include recommendations to reduce ground resistance.
- D. Grounding system will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

END OF SECTION

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SECTION 27 0528

PATHWAYS FOR COMMUNICATIONS 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. Metal conduits and fittings.
2. Nonmetallic conduits and fittings.
3. Optical-fiber-cable pathways and fittings.
4. Boxes, enclosures, and cabinets.
5. Handholes and boxes for exterior underground cabling.

B. Related Requirements:

1. Section 260543 "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.
2. Section 260533 "Raceways and Boxes for Electrical Systems" for conduits, wireways, surface raceways, boxes, enclosures, cabinets, handholes, and faceplate adapters serving electrical systems.

1.3 DEFINITIONS

- A. GRC: Galvanized rigid steel conduit.
- B. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

- A. Product Data: For surface pathways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. LEED Submittals:
 1. Product Data for Credit IEQ 4.1: For solvent cements and adhesive primers, documentation including printed statement of VOC content.
 2. Laboratory Test Reports for Credit IEQ 4: For solvent cements and adhesive primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- C. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Pathway routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
 - 1. Structural members in paths of pathway groups with common supports.
 - 2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.
- B. Qualification Data: For professional engineer.
- C. Seismic Qualification Certificates: For pathway racks, enclosures, cabinets, equipment racks and their mounting provisions, including those for internal components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which certification is based and their installation requirements.
 - 4. Detailed description of conduit support devices and interconnections on which certification is based and their installation requirements.
- D. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

- 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. AFC Cable Systems, Inc.
 - 2. Allied Tube & Conduit.
 - 3. Alpha Wire Company.
 - 4. Anamet Electrical, Inc.
 - 5. Electri-Flex Company.
 - 6. O-Z/Gedney.
 - 7. Picoma Industries.
 - 8. Republic Conduit.
 - 9. Robroy Industries.
 - 10. Southwire Company.
 - 11. Thomas & Betts Corporation.
 - 12. Western Tube and Conduit Corporation.
 - 13. Wheatland Tube Company.
 - 14. Or equal.

B. General Requirements for Metal Conduits and Fittings:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with TIA-569-B.

C. GRC: Comply with ANSI C80.1 and UL 6.

D. IMC: Comply with ANSI C80.6 and UL 1242.

E. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.

1. Comply with NEMA RN 1.
2. Coating Thickness: 0.040 inch (1 mm), minimum.

F. EMT: Comply with ANSI C80.3 and UL 797.

G. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT:
 - a. Material: die cast.
 - b. Type: compression.
3. Expansion Fittings: PVC or steel to match conduit type, complying with UL-467, rated for environmental conditions where installed, and including flexible external bonding jumper.
4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.

H. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS AND FITTINGS

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. AFC Cable Systems, Inc.
2. Allied Tube & Conduit.
3. Anamet Electrical, Inc.
4. Amco Corporation.
5. CANTEX Inc.
6. CertainTeed Corporation.
7. Condux International, Inc.
8. Electri-Flex Company.
9. Kraloy.
10. Lamson & Sessions; Carlon Electrical Products.
11. Niedax-Kleinhuis USA, Inc.
12. RACO; Hubbell.
13. Thomas & Betts Corporation.
14. Or equal.

- B. General Requirements for Nonmetallic Conduits and Fittings:
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Comply with TIA-569-B.
- C. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- D. Rigid HDPE: Comply with UL 651A.
- E. Continuous HDPE: Comply with UL 651B.
- F. RTRC: Comply with UL 1684A and NEMA TC 14.
- G. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
- H. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method24).
- I. Solvent cements and adhesive primers 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."

2.3 OPTICAL-FIBER-CABLE PATHWAYS AND FITTINGS

- 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. Alpha Wire Company.
 - 2. Arnco Corporation.
 - 3. Endot Industries Inc.
 - 4. IPEX.
 - 5. Lamson & Sessions; Carlon Electrical Products.
 - 6. Or equal.
- B. Description: Comply with UL 2024; flexible-type pathway, approved for plenum installation unless otherwise indicated.
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Comply with TIA-569-B.

2.4 BOXES, ENCLOSURES, AND CABINETS

- 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. Cooper Technologies Company; Cooper Crouse-Hinds.
 - 2. EGS/Appleton Electric.
 - 3. Erickson Electrical Equipment Company.
 - 4. Hoffman.
 - 5. Mono-Systems, Inc.
 - 6. O-Z/Gedney.
 - 7. Thomas & Betts Corporation.

8. Wiremold / Legrand.
 9. Or equal.
- B. General Requirements for Boxes, Enclosures, and Cabinets:
1. Comply with TIA-569-B.
 2. Boxes, enclosures and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet-Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- E. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- F. Metal Floor Boxes:
1. Material: Cast metal.
 2. Type: Fully adjustable.
 3. Shape: Rectangular.
 4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- H. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.
- I. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep).
- J. Gangable boxes are prohibited.
- K. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.
1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 2. Nonmetallic Enclosures:
 - a. Material: Plastic.
 - b. Finished inside with radio-frequency-resistant paint.
 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- L. Cabinets:
1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 2. Hinged door in front cover with flush latch and concealed hinge.
 3. Key latch to match panelboards.
 4. Metal barriers to separate wiring of different systems and voltage.
 5. Accessory feet where required for freestanding equipment.

6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.5 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND CABLING

A. General Requirements for Handholes and Boxes:

1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Comply with TIA-569-B.

B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.

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. Armorcast Products Company.
 - b. Carson Industries LLC.
 - c. NewBasis.
 - d. Oldcastle Precast, Inc; Christy Concrete Products.
 - e. Quazite; Hubbell Power System, Inc; Hubbell Power Systems.
 - f. Synertech Moulded Products.
 - g. Or equal.
2. Standard: Comply with SCTE 77.
3. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
6. Cover Legend: Molded lettering, "COMMUNICATIONS."
7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
8. Handholes 12 Inches Wide by 24 Inches Long (300 mm Wide by 600 mm Long) and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.6 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.

1. Tests of materials shall be performed by an independent testing agency.
2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

PART 3 - EXECUTION

3.1 PATHWAY APPLICATION

- A. Outdoors: Apply pathway products as specified below unless otherwise indicated:
1. Exposed Conduit: GRC.
 2. Concealed Conduit, Aboveground: EMT.
 3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
 4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Indoors: Apply pathway products as specified below unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT.
 2. Exposed, Not Subject to Severe Physical Damage: EMT.
 3. Exposed and Subject to Severe Physical Damage: GRC.
 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 5. Damp or Wet Locations: GRC.
 6. Pathways for Optical-Fiber or Communications Cable in Spaces Used for Environmental Air: EMT.
 7. Pathways for Optical-Fiber or Communications-Cable Risers in Vertical Shafts: EMT.
 8. Pathways for Concealed General-Purpose Distribution of Optical-Fiber or Communications Cable: EMT.
 9. Boxes and Enclosures: NEMA 250 Type 1, except use NEMA 250 Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.
- C. Minimum Pathway Size: 3/4-inch (21-mm) trade size. Minimum size for optical-fiber cables is 1 inch (27 mm).
- D. Pathway Fittings: Compatible with pathways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB2.10.
 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 3. EMT: Use compression, cast-metal fittings. Comply with NEMA FB2.10.
- E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- F. Install surface pathways only where indicated on Drawings.
- G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

3.2 INSTALLATION

- A. Comply with NECA 1, NECA 101, and TIA-569-B for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum pathways. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.

- B. Keep pathways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.
- C. Complete pathway installation before starting conductor installation.
- D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- E. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- F. Install no more than the equivalent of two 90-degree bends in any pathway run. Support within 12 inches (300 mm) of changes in direction. Utilize long radius ells for all optical-fiber cables.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- H. Support conduit within 12 inches (300 mm) of enclosures to which attached.
- I. Pathways Embedded in Slabs:
 - 1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure pathways to reinforcement at maximum 10-foot (3-m) intervals.
 - 2. Arrange pathways to cross building expansion joints at right angles with expansion fittings.
 - 3. Arrange pathways to keep a minimum of 1 inch (25 mm) of concrete cover in all directions.
 - 4. Do not embed threadless fittings in concrete unless specifically approved by Architect and Resident Engineer for each specific location.
 - 5. Change from ENT to RNC, Type EPC-40-PVC, before rising above floor.
- J. Stub-ups to Above Recessed Ceilings:
 - 1. Use EMT, IMC, or RMC for pathways.
 - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- K. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.
- L. Coat field-cut threads on PVC-coated pathway with a corrosion-preventing conductive compound prior to assembly.
- M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.
- N. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- O. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- P. Cut conduit perpendicular to the length. For conduits of 2-inch (53-mm) trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.

- Q. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground pathways designated as spare above grade alongside pathways in use.
- R. Pathways for Optical-Fiber and Communications Cable: Install pathways, metal and nonmetallic, rigid and flexible, as follows:
1. 3/4-Inch (21-mm) Trade Size and Smaller: Install pathways in maximum lengths of 50 feet (15 m).
 2. 1-Inch (27-mm) Trade Size and Larger: Install pathways in maximum lengths of 75 feet (23 m).
 3. Install with a maximum of two 90-degree bends or equivalent for each length of pathway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
- S. Install pathway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed pathways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install pathway sealing fittings according to NFPA 70.
- T. Install devices to seal pathway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where an underground service pathway enters a building or structure.
 3. Where otherwise required by NFPA 70.
- U. Comply with manufacturer's written instructions for solvent welding PVC conduit and fittings.
- V. Expansion-Joint Fittings:
1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C), and that has straight-run length that exceeds 25 feet (7.6 m). Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F (55 deg C) and that has straight-run length that exceeds 100 feet (30 m).
 2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
 - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

W. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

X. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surface to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

Y. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

Z. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

AA. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

BB. Set metal floor boxes level and flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 for pipe less than 6 inches (150 mm) in nominal diameter.
2. Install backfill as specified in Division 31.
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31.
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.

5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete for a minimum of 12 inches (300 mm) on each side of the coupling.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
6. Warning Planks: Bury warning planks approximately 12 inches (300 mm) above direct-buried conduits, but a minimum of 6 inches (150 mm) below grade. Align planks along centerline of conduit.
7. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch (12.5-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch (25 mm) above finished grade.
- D. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in enclosure.
- E. Field cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR COMMUNICATIONS PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 270544 "Sleeves and Sleeve Seals for Communications Pathways and Cabling."

3.6 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Division 07.

3.7 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage or deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 27 15 00

COMMUNICATIONS HORIZONTAL CABLING

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. UTP cabling.
2. 62.5/125-micrometer, optical fiber cabling.
3. Coaxial cable.
4. Multiuser telecommunications outlet assemblies.
5. Cable connecting hardware, patch panels, and cross-connects.
6. Telecommunications outlet/connectors.
7. Cabling system identification products.
8. Cable management system.

B. Related Requirements:

1. Section 28 05 13 "Conductors and Cables for Electronic Safety and Security" for voice and data cabling associated with system panels and devices.

1.3 DEFINITIONS

- A. BICSI: Building Industry Consulting Service International.
- B. Consolidation Point: A location for interconnection between horizontal cables extending from building pathways and horizontal cables extending into furniture pathways.
- C. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- D. EMI: Electromagnetic interference.
- E. IDC: Insulation displacement connector.
- F. LAN: Local area network.
- G. MUTOA: Multiuser telecommunications outlet assembly, a grouping in one location of several telecommunications outlet/connectors.

- H. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.
- I. RCDD: Registered Communications Distribution Designer.
- J. UTP: Unshielded twisted pair.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate layout and installation of telecommunications cabling with Owner's telecommunications and LAN equipment and service suppliers.
- B. Coordinate telecommunications outlet/connector locations with location of power receptacles at each work area.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For coaxial cable, include the following installation data for each type used:
 - a. Nominal OD.
 - b. Minimum bending radius.
 - c. Maximum pulling tension.
- B. Shop Drawings:
 - 1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
 - 2. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
 - 3. Cabling administration drawings and printouts.
 - 4. Wiring diagrams to show typical wiring schematics, including the following:
 - a. Cross-connects.
 - b. Patch panels.
 - c. Patch cords.
 - 5. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, qualified layout technician, installation supervisor, and field inspector.
- B. Source quality-control reports.
- C. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For splices and connectors to include in maintenance manuals.
- B. Software and Firmware Operational Documentation:
 - 1. Software operating and upgrade manuals.
 - 2. Program Software Backup: On magnetic media or compact disk, complete with data files.
 - 3. Device address list.
 - 4. Printout of software application and graphic screens.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Patch-Panel Units: One of each type.
 - 2. Connecting Blocks: One of each type.
 - 3. Device Plates: One of each type.
 - 4. Multiuser Telecommunications Outlet Assemblies: One of each type.

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
 - 1. Layout Responsibility: Preparation of Shop Drawings, Cabling Administration Drawings, and field testing program development by an RCDD.
 - 2. Installation Supervision: Installation shall be under the direct supervision of Registered Technician, who shall be present at all times when Work of this Section is performed at Project site.
 - 3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
- B. Testing Agency Qualifications: An NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
 - 1. Test optical fiber cables to determine the continuity of the strand end to end. Use optical fiber flashlight or optical loss test set.
 - 2. Test optical fiber cables while on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector; including the loss value of each. Retain test data and include the record in maintenance data.
 - 3. Test each pair of UTP cable for open and short circuits.

PART 2 - PRODUCTS

2.1 HORIZONTAL CABLING DESCRIPTION

- A. Horizontal cable and its connecting hardware provide the means of transporting signals between the telecommunications outlet/connector and the horizontal cross-connect located in the communications equipment room. This cabling and its connecting hardware are called a "permanent link," a term that is used in the testing protocols.
 - 1. TIA/EIA-568-B.1 requires that a minimum of two telecommunications outlet/connectors be installed for each work area.
 - 2. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications outlet/connector.
 - 3. Bridged taps and splices shall not be installed in the horizontal cabling.
 - 4. Splitters shall not be installed as part of the optical fiber cabling.
- B. A work area is approximately 100 sq. ft. (9.3 sq. m), and includes the components that extend from the telecommunications outlet/connectors to the station equipment.
- C. The maximum allowable horizontal cable length is 295 feet (90 m). This maximum allowable length does not include an allowance for the length of 16 feet (4.9 m) to the workstation equipment or in the horizontal cross-connect.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA/EIA-568-B.1 when tested according to test procedures of this standard.
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing 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. Grounding: Comply with J-STD-607-A.

2.3 BACKBOARDS

- A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm). Comply with requirements in Division 06 for plywood backing panels.

2.4 UTP CABLE

- 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. Belden Inc.
 - 2. Berk-Tek; a Nexans company.
 - 3. CommScope, Inc.

4. Superior Essex Inc.
5. SYSTIMAX Solutions; a CommScope, Inc. brand.
6. 3M Communication Markets Division.
7. Tyco Electronics Corporation; AMP Products.
8. Or equal.

B. Description: 100-ohm, four-pair UTP, formed into 25-pair, binder groups covered with a blue thermoplastic jacket.

1. Comply with ICEA S-90-661 for mechanical properties.
2. Comply with TIA/EIA-568-B.1 for performance specifications.
3. Comply with TIA/EIA-568-B.2, Category 6.
4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
 - a. Communications, General Purpose: Type CM or CMG.
 - b. Communications, Plenum Rated: Type CMP, complying with NFPA 262.
 - c. Communications, Riser Rated: Type CMR, complying with UL 1666.

2.5 UTP CABLE HARDWARE

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. Belden Inc.
2. Dynacom Inc.
3. Leviton Commercial Networks Division.
4. Molex Premise Networks; a division of Molex, Inc.
5. Panduit Corp.
6. Siemon Co. (The).
7. Tyco Electronics Corporation; AMP Products.
8. Or equal.

B. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.

C. Connecting Blocks: 110-style IDC for Category 6. Provide blocks for the number of cables terminated on the block, plus 25 percent spare. Integral with connector bodies, including plugs and jacks where indicated.

D. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.

1. Number of Terminals per Field: One for each conductor in assigned cables.

E. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.

1. Number of Jacks per Field: One for each four-pair conductor group of indicated cables, plus spares and blank positions adequate to suit specified expansion criteria.

F. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.

- G. Patch Cords: Factory-made, four-pair cables in 36-inch (900 mm) lengths; terminated with eight-position modular plug at each end.
1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance. Patch cords shall have latch guards to protect against snagging.
 2. Patch cords shall have color-coded boots for circuit identification.

2.6 OPTICAL FIBER CABLE

- 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. Belden Inc.
2. Berk-Tek; a Nexans company.
3. Mohawk; a division of Belden Networking, Inc.
4. Superior Essex Inc.
5. SYSTIMAX Solutions; a CommScope, Inc. brand.
6. 3M Communication Markets Division.
7. Tyco Electronics Corporation; AMP Products.
8. Or equal.

- B. Description: Multimode, 62.5/125-micrometer, 24-fiber, tight buffer, optical fiber cable.

1. Comply with ICEA S-83-596 for mechanical properties.
2. Comply with TIA/EIA-568-B.3 for performance specifications.
3. Comply with TIA-492AAAB for detailed specifications.
4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
 - a. General Purpose, Conductive: Type OFC or OFCG.
 - b. Plenum Rated, Conductive: Type OFCP, complying with NFPA 262.
5. Conductive cable shall be aluminum armored type.
6. Maximum Attenuation: 3.50 dB/km at 850 nm; 1.5 dB/km at 1300 nm.
7. Minimum Modal Bandwidth: 160 MHz-km at 850 nm; 500 MHz-km at 1300 nm.

- C. Jacket:

1. Jacket Color: Orange for 62.5/125-micrometer cable.
2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-C.
3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches (1000 mm).

2.7 OPTICAL FIBER CABLE HARDWARE

- 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. Belden Inc.
2. Berk-Tek; a Nexans company.
3. Dynacom Inc.
4. Hubbell Premise Wiring.
5. Molex Premise Networks; a division of Molex, Inc.

6. Siemon Co. (The).
7. Or equal.

B. Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors.

1. Number of Connectors per Field: One for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to suit specified expansion criteria.

C. Patch Cords: Factory-made, dual-fiber cables in 36-inch (900-mm) lengths.

D. Cable Connecting Hardware:

1. Comply with Optical Fiber Connector Intermateability Standards (FOCIS) specifications of TIA-604-2-B, TIA-604-3-B, and TIA/EIA-604-12. Comply with TIA/EIA-568-B.3.
2. Quick-connect, simplex and duplex, Type LC connectors. Insertion loss not more than 0.75 dB.
3. Type SFF connectors may be used in termination racks, panels, and equipment packages.

2.8 COAXIAL CABLE

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. Alpha Wire Company.
2. Belden Inc.
3. Coleman Cable, Inc.
4. CommScope, Inc.
5. Draka Cabletek USA.
6. Or equal.

B. Cable Characteristics: Broadband type, recommended by cable manufacturer specifically for broadband data transmission applications. Coaxial cable and accessories shall have 75-ohm nominal impedance with a return loss of 20 dB maximum from 7 to 806MHz.

C. RG-11/U: NFPA 70, Type CATV.

1. No. 14 AWG, solid, copper-covered steel conductor.
2. Gas-injected, foam-PE insulation.
3. Double shielded with 100 percent aluminum polyester tape and 60 percent aluminum braid.
4. Jacketed with sunlight-resistant, black PVC or PE.
5. Suitable for outdoor installations in ambient temperatures ranging from minus 40 to plus 85 deg C.

D. RG-6/U: NFPA 70, Type CATV or CM.

1. No. 16 AWG, solid, copper-covered steel conductor; gas-injected, foam-PE insulation.
2. Double shielded with 100 percent aluminum-foil shield and 60 percent aluminum braid.
3. Jacketed with black PVC or PE.
4. Suitable for indoor installations.

E. RG59/U: NFPA 70, Type CATV.

1. No. 20 AWG, solid, copper-covered steel conductor; gas-injected, foam-PE insulation.
2. Double shielded with 100 percent aluminum polyester tape and 40 percent aluminum braid.
3. PVC jacket.

F. NFPA and UL compliance, listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1655 and with NFPA 70 "Radio and Television Equipment" and "Community Antenna Television and Radio Distribution" Articles. Types are as follows:

1. CATV Cable: Type CATV, or CATVP or CATVR.
2. CATV Plenum Rated: Type CATVP, complying with NFPA 262.

2.9 COAXIAL CABLE HARDWARE

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. Emerson Network Power Connectivity Solutions.
2. Leviton Commercial Networks Division.
3. Siemon Co. (The).
4. Or equal.

B. Coaxial-Cable Connectors: Type BNC, 75 ohms.

2.10 CONSOLIDATION POINTS

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. Hubbell Premise Wiring.
2. Molex Premise Networks; a division of Molex, Inc.
3. Ortronics, Inc.; a subsidiary of Legrand Group.
4. Panduit Corp.
5. Siemon Co. (The).
6. Or equal.

B. Description: Consolidation points shall comply with requirements for cable connecting hardware.

1. Number of Terminals per Field: One for each conductor in assigned cables.
2. Number of Connectors per Field:
 - a. One for each four-pair UTP cable indicated.
 - b. One for each four-pair conductor group of indicated cables, plus 25 percent spare positions.
3. Mounting: Recessed in ceiling.
4. NRTL listed as complying with UL 50 and UL 1863.
5. When installed in plenums used for environmental air, NRTL listed as complying with UL 2043.

2.11 MULTIUSER TELECOMMUNICATIONS OUTLET ASSEMBLY (MUTOA)

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. Belden Inc.
2. Chatsworth Products, Inc.
3. Hubbell Premise Wiring.
4. Molex Premise Networks; a division of Molex, Inc.
5. Ortronics, Inc.; a subsidiary of Legrand Group.
6. Panduit Corp.
7. Siemon Co. (The).
8. Or equal.

B. Description: MUTOAs shall meet the requirements for cable connecting hardware.

1. Number of Terminals per Field: One for each conductor in assigned cables.
2. Number of Connectors per Field:
 - a. One for each four-pair UTP cable indicated.
 - b. One for each four-pair conductor group of indicated cables, plus 25 percent spare positions.
3. Mounting: Recessed in ceiling.
4. NRTL listed as complying with UL 50 and UL 1863.
5. Label shall include maximum length of work area cords, based on TIA/EIA-568-B.1.
6. When installed in plenums used for environmental air, NRTL listed as complying with UL 2043.

2.12 TELECOMMUNICATIONS OUTLET/CONNECTORS

A. Jacks: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA/EIA-568-B.1.

B. Workstation Outlets: Four-port-connector assemblies mounted in single faceplate.

1. Plastic Faceplate: High-impact plastic. Coordinate color with Section 26 27 26 "Wiring Devices."
2. For use with snap-in jacks accommodating any combination of UTP, optical fiber, and coaxial work area cords.
 - a. Flush mounting jacks, positioning the cord at a 45-degree angle.
3. Legend: Machine printed, in the field, using adhesive-tape label.
4. Legend: Snap-in, clear-label covers and machine-printed paper inserts.

2.13 GROUNDING

A. Comply with requirements in Section 26 05 26 "Grounding and Bonding for Electrical Systems" for grounding conductors and connectors.

B. Comply with J-STD-607-A.

2.14 IDENTIFICATION PRODUCTS

- A. Comply with TIA/EIA-606-A and UL 969 for labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- B. Comply with requirements in Section 26 05 53 "Identification for Electrical Systems."

2.15 CABLE MANAGEMENT SYSTEM

- 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. ITRACS Corporation, Inc.
 - 2. TelSoft Solutions.
 - 3. Or equal.
- B. Description: Computer-based cable management system, with integrated database and graphic capabilities.
- C. Document physical characteristics by recording the network, TIA/EIA details, and connections between equipment and cable.
- D. Information shall be presented in database view, schematic plans, or technical drawings.
 - 1. AutoCAD drawing software shall be used as drawing and schematic plans software.
- E. System shall interface with the following testing and recording devices:
 - 1. Direct upload tests from circuit testing instrument into the personal computer.
 - 2. Direct download circuit labeling into labeling printer.

2.16 SOURCE QUALITY CONTROL

- A. Factory test UTP and optical fiber cables on reels according to TIA/EIA-568-B.1.
- B. Factory test UTP cables according to TIA/EIA-568-B.2.
- C. Factory test multimode optical fiber cables according to TIA-526-14-A and TIA/EIA-568-B.3.
- D. Factory-sweep test coaxial cables at frequencies from 5 MHz to 1 GHz. Sweep test shall test the frequency response, or attenuation over frequency, of a cable by generating a voltage whose frequency is varied through the specified frequency range and graphing the results.
- E. Cable will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 ENTRANCE FACILITIES

- A. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

3.2 WIRING METHODS

- A. Install cables in pathways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Conceal pathways and cables except in unfinished spaces.
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
 - 2. Comply with requirements in Section 27 05 28 "Pathways for Communications Systems."
 - 3. Comply with requirements in Section 27 05 36 "Cable Trays for Communications Systems."
- B. Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- C. Wiring within Enclosures:
 - 1. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
 - 2. Install lacing bars and distribution spools.
 - 3. Install conductors parallel with or at right angles to sides and back of enclosure.

3.3 INSTALLATION OF CABLES

- A. Comply with NECA 1.
- B. General Requirements for Cabling:
 - 1. Comply with TIA/EIA-568-B.1.
 - 2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
 - 3. Install 110-style IDC termination hardware unless otherwise indicated.
 - 4. MUTOA shall not be used as a cross-connect point.
 - 5. Consolidation points may be used only for making a direct connection to telecommunications outlet/connectors:
 - a. Do not use consolidation point as a cross-connect point, as a patch connection, or for direct connection to workstation equipment.
 - b. Locate consolidation points for UTP at least 49 feet (15 m) from communications equipment room.
 - 6. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
 - 7. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.

8. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
9. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
10. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
11. In the communications equipment room, install a 10-foot- (3-m-) long service loop on each end of cable.
12. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. UTP Cable Installation:

1. Comply with TIA/EIA-568-B.2.
2. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.

D. Optical Fiber Cable Installation:

1. Comply with TIA/EIA-568-B.3.
2. Cable may be terminated on connecting hardware that is rack or cabinet mounted.

E. Outdoor Coaxial Cable Installation:

1. Install outdoor connections in enclosures complying with NEMA 250, Type 4X. Install corrosion-resistant connectors with properly designed O-rings to keep out moisture.
2. Attach antenna lead-in cable to support structure at intervals not exceeding 36 inches (915 mm).

F. Group connecting hardware for cables into separate logical fields.

G. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA-569-B for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (610mm).
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300mm).

4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (76 mm).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150mm).
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.4 FIRESTOPPING

- A. Comply with requirements in Division 07.
- B. Comply with TIA-569-B, Annex A, "Firestopping."
- C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.5 GROUNDING

- A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. Comply with J-STD-607-A.
- C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
- D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.6 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."
 1. Administration Class: 1.
 2. Color-code cross-connect fields. Apply colors to voice and data service backboards, connections, covers, and labels.
- B. Using cable management system software specified in Part 2, develop Cabling Administration Drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable and label cable, jacks, connectors, and terminals to which it connects with same designation. At completion, cable and asset management software shall reflect as-built conditions.

- C. Comply with requirements in Division 09 for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.
- D. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 2 level of administration, including optional identification requirements of this standard.
- E. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- F. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606-A. Furnish electronic record of all drawings, in software and format selected by Owner.
- G. Cable and Wire Identification:
 - 1. Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
 - 2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
 - 3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet (4.5 m).
 - 4. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
 - a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
 - b. Label each unit and field within distribution racks and frames.
 - 5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
 - 6. Uniquely identify and label work area cables extending from the MUTOA to the work area. These cables may not exceed the length stated on the MUTOA label.
- H. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-A.
 - 1. Cables use flexible vinyl or polyester that flex as cables are bent.

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Visually inspect UTP and optical fiber cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-B.1.
2. Visually confirm Category 6, marking of outlets, cover plates, outlet/connectors, and patch panels.
3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
4. Test UTP backbone copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
 - a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
5. Optical Fiber Cable Tests:
 - a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
 - b. Link End-to-End Attenuation Tests:
 - 1) Horizontal and multimode backbone link measurements: Test at 850 or 1300 nm in 1 direction according to TIA-526-14-A, Method B, One Reference Jumper.
 - 2) Attenuation test results for backbone links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-B.1.
6. UTP Performance Tests:
 - a. Test for each outlet and MUTOA. Perform the following tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.2:
 - 1) Wire map.
 - 2) Length (physical vs. electrical, and length requirements).
 - 3) Insertion loss.
 - 4) Near-end crosstalk (NEXT) loss.
 - 5) Power sum near-end crosstalk (PSNEXT) loss.
 - 6) Equal-level far-end crosstalk (ELFEXT).
 - 7) Power sum equal-level far-end crosstalk (PSELFEXT).
 - 8) Return loss.
 - 9) Propagation delay.
 - 10) Delay skew.

7. Optical Fiber Cable Performance Tests: Perform optical fiber end-to-end link tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.3.
 8. Coaxial Cable Tests: Conduct tests according to manufacturer's recommendation.
 9. Final Verification Tests: Perform verification tests for UTP and optical fiber systems after the complete communications cabling and workstation outlet/connectors are installed.
 - a. Voice Tests: These tests assume that dial tone service has been installed. Connect to the network interface device at the demarcation point. Go off-hook and listen and receive a dial tone. If a test number is available, make and receive a local, long distance, and digital subscription line telephone call.
 - b. Data Tests: These tests assume the Information Technology Staff has a network installed and is available to assist with testing. Connect to the network interface device at the demarcation point. Log onto the network to ensure proper connection to the network.
- B. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.
 - C. End-to-end cabling will be considered defective if it does not pass tests and inspections.
 - D. Prepare test and inspection reports.

3.8 SOFTWARE SERVICE AGREEMENT

- A. Technical Support: Beginning with Substantial Completion, provide software support for two years.
- B. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
 1. Provide 30 days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

END OF SECTION

SECTION 28 05 13

CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Fire alarm wire and cable.
 - 2. Identification products.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.
- B. Source quality-control reports.
- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site. Test each pair of UTP cable for open and short circuits.

1.7 FIELD CONDITIONS

- A. Do not install conductors and cables that are wet, moisture damaged, or mold damaged.
 - 1. Indications that wire and cables are wet or moisture damaged include, but are not limited to, discoloration and sagging of factory packing materials.

- B. Environmental Limitations: Do not deliver or install UTP cable and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing 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.
- 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.

2.2 BACKBOARDS

- A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm). Comply with requirements for plywood backing panels in Section 061000 "Rough Carpentry."

2.3 FIRE ALARM WIRE AND CABLE

- 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. Comtran Corporation.
 - 2. Draka Cabletek USA.
 - 3. Genesis Cable Products; Honeywell International, Inc.
 - 4. Rockbestos-Suprenant Cable Corp.
 - 5. West Penn Wire.
 - 6. Or equal.
- B. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.
- C. Signaling Line Circuits: Twisted, shielded pair, not less than No. 18 AWG size as recommended by system manufacturer.
 - 1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a 2-hour rating.
- D. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.
 - 1. Low-Voltage Circuits: No. 16 AWG, minimum.
 - 2. Line-Voltage Circuits: No. 12 AWG, minimum.

3. Multiconductor Armored Cable: NFPA 70, Type MC, copper conductors, Type TFN/THHN conductor insulation, copper drain wire, copper armor with outer jacket with red identifier stripe, NTRL listed for fire alarm and cable tray installation, plenum rated, and complying with requirements in UL 2196 for a 2-hour rating.

2.4 IDENTIFICATION PRODUCTS

- 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. Brady Worldwide, Inc.
 2. HellermannTyton North America.
 3. Kroy LLC.
 4. Panduit Corp.
 5. Or equal.
- B. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- C. Comply with requirements in Section 260553 "Identification for Electrical Systems."

2.5 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Cable will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 INSTALLATION OF HANGERS AND SUPPORTS

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for installation of supports for cables.

3.2 WIRING METHOD

- A. Install wiring in metal pathways and wireways.
 1. Minimum conduit size shall be 3/4 inch (21 mm). Control and data transmission wiring shall not share conduit with other building wiring systems.
- B. Install cable, concealed in accessible ceilings, walls, and floors when possible.
- C. Wiring within Enclosures:
 1. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
 2. Install lacing bars and distribution spools.

3. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer.
4. Install conductors parallel with or at right angles to sides and back of enclosure.
5. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with intrusion system to terminal blocks.
6. Mark each terminal according to system's wiring diagrams.
7. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Comply with NECA 1.
- B. Conductors: Size according to system manufacturer's written instructions unless otherwise indicated.
- C. General Requirements for Cabling:
 1. Comply with TIA/EIA-568-B.1.
 2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
 3. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
 4. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 5. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
 6. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
 7. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
- D. Separation from EMI Sources:
 1. Comply with BICSI TDMM and TIA-569-B recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
 2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (600mm).
 3. Separation between cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (75 mm).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).

4. Separation between Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
5. Separation between Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.4 FIRE ALARM WIRING INSTALLATION

- A. Comply with NECA 1 and NFPA 72.
- B. Wiring Method: Install wiring in metal raceway according to Section 260533 "Raceways and Boxes for Electrical Systems."
 1. Install plenum cable in environmental air spaces, including plenum ceilings.
 2. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system. This system shall not be used for any other wire or cable.
- C. Wiring Method:
 1. Cables and raceways used for fire alarm circuits, and equipment control wiring associated with the fire alarm system, may not contain any other wire or cable.
 2. Fire-Rated Cables: Use of 2-hour, fire-rated fire alarm cables, NFPA 70, Types MI and CI, is permitted.
 3. Signaling Line Circuits: Power-limited fire alarm cables may be installed in the same cable or raceway as signaling line circuits.
- D. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
- E. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.
- F. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.
- G. Risers: Install at least two vertical cable risers to serve the fire alarm system. Separate risers in close proximity to each other with a minimum one-hour-rated wall, so the loss of one riser does not prevent the receipt or transmission of signals from other floors or zones.
- H. Wiring to Remote Alarm Transmitting Device: 1-inch (25-mm) conduit between the fire alarm control panel and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.5 POWER AND CONTROL-CIRCUIT CONDUCTORS

- A. 120-V Power Wiring: Install according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables" unless otherwise indicated.
- B. Minimum Conductor Sizes:
 - 1. Class 1 remote-control and signal circuits, No. 14 AWG.
 - 2. Class 2 low-energy, remote-control and signal circuits, No. 16 AWG.
 - 3. Class 3 low-energy, remote-control, alarm and signal circuits, No. 12 AWG.

3.6 CONNECTIONS

- A. Comply with requirements in Section 283111 "Digital, Addressable Fire-Alarm System for connecting, terminating, and identifying wires and cables.

3.7 FIRESTOPPING

- A. Comply with requirements in Division 07 "Penetration Firestopping."
- B. Comply with TIA-569-B, "Firestopping" Annex A.
- C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.8 GROUNDING

- A. For communications wiring, comply with J-STD-607-A and with BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. For low-voltage wiring and cabling, comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

3.9 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.10 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
- B. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.
- C. End-to-end cabling will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION

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SECTION 28 31 11

DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fire-alarm control unit.
2. Manual fire-alarm boxes.
3. System smoke detectors.
4. Air-sampling smoke detectors.
5. Heat detectors.
6. Notification appliances.
7. Firefighters' two-way telephone communication service.
8. Firefighters' smoke-control station.
9. Remote annunciator.
10. Digital alarm communicator transmitter.
11. Network communications.
12. System printer.

B. Related Requirements:

1. Section 280513 "Conductors and Cables for Electronic Safety and Security" for cables and conductors for fire-alarm systems.

1.3 DEFINITIONS

- A. EMT: Electrical Metallic Tubing.
- B. FACP: Fire Alarm Control Panel.
- C. HLI: High Level Interface.
- D. NICET: National Institute for Certification in Engineering Technologies.
- E. PC: Personal computer.
- F. VESDA: Very Early Smoke-Detection Apparatus.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product, including furnished options and accessories.
1. Include construction details, material descriptions, dimensions, profiles, and finishes.
 2. Include rated capacities, operating characteristics, and electrical characteristics.
- B. Shop Drawings: For fire-alarm system.
1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 2. Include plans, elevations, sections, details, and attachments to other work.
 3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
 4. Detail assembly and support requirements.
 5. Include voltage drop calculations for notification-appliance circuits.
 6. Include battery-size calculations.
 7. Include input/output matrix.
 8. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
 9. Include performance parameters and installation details for each detector.
 10. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
 11. Provide program report showing that air-sampling detector pipe layout balances pneumatically within the airflow range of the air-sampling detector.
 12. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale; coordinate location of duct smoke detectors and access to them.
 - a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
 - b. Show field wiring required for HVAC unit shutdown on alarm.
 - c. Show field wiring and equipment required for HVAC unit shutdown on alarm and override by firefighters' control system.
 - d. Show field wiring and equipment required for HVAC unit shutdown on alarm and override by firefighters' smoke-evacuation system.
 - e. Locate detectors according to manufacturer's written recommendations.
 - f. Show air-sampling detector pipe routing.
 13. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
 14. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.
- C. General Submittal Requirements:
1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect and Resident Engineer.
 2. Shop Drawings shall be prepared by persons with the following qualifications:
 - a. Trained and certified by manufacturer in fire-alarm system design.
 - b. NICET-certified, fire-alarm technician; Level IV minimum.
 - c. Licensed or certified by authorities having jurisdiction.

- D. Delegated-Design Submittal: For notification appliances and smoke and heat detectors, in addition to submittals listed above, indicate compliance with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Drawings showing the location of each notification appliance and smoke and heat detector, ratings of each, and installation details as needed to comply with listing conditions of the device.
 2. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72. Calculate spacing and intensities for strobe signals and sound-pressure levels for audible appliances.
 3. Indicate audible appliances required to produce square wave signal per NFPA 72.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Seismic Qualification Certificates: For fire-alarm control unit, accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field quality-control reports.

1.6 Sample Warranty: For manufacturer's standard warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.
1. In addition to items specified in Division 01, include the following and deliver copies to authorities having jurisdiction:
 - a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
 - d. Riser diagram.
 - e. Device addresses.
 - f. Air-sampling system sample port locations and modeling program report showing layout meets performance criteria.
 - g. Record copy of site-specific software.

- h. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:
 - 1) Equipment tested.
 - 2) Frequency of testing of installed components.
 - 3) Frequency of inspection of installed components.
 - 4) Requirements and recommendations related to results of maintenance.
 - 5) Manufacturer's user training manuals.
- i. Manufacturer's required maintenance related to system warranty requirements.
- j. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.

B. Software and Firmware Operational Documentation:

- 1. Software operating and upgrade manuals.
- 2. Program Software Backup: On magnetic media or compact disk, complete with data files.
- 3. Device address list.
- 4. Printout of software application and graphic screens.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Lamps for Remote Indicating Lamp Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
 - 2. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
 - 3. Smoke Detectors, Fire Detectors: Quantity equal to 10 percent of amount of each type installed, but no fewer than one unit of each type.
 - 4. Detector Bases: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.
 - 5. Keys and Tools: One extra set for access to locked or tamper proofed components.
 - 6. Audible and Visual Notification Appliances: One of each type installed.
 - 7. Fuses: Two of each type installed in the system. Provide in a box or cabinet with compartments marked with fuse types and sizes.

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
- B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level IV technician.
- C. NFPA Certification: Obtain certification according to NFPA 72 by an NRTL (nationally recognized testing laboratory).
- D. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.
- E. NFPA Certification: Obtain certification according to NFPA 72 in the form of a placard by an FM Global-approved alarm company.

1.10 PROJECT CONDITIONS

- A. Perform a full test of the existing system prior to starting work. Document any equipment or components not functioning as designed.
- B. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.

1.11 WARRANTY

- A. Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Extent: All equipment and components not covered in the Maintenance Service Agreement.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Source Limitations for Fire-Alarm System and Components: Components shall be compatible with, and operate as an extension of, existing system. Provide system manufacturer's certification that all components provided have been tested as, and will operate as, a system.
- B. Noncoded, UL-certified addressable system, with multiplexed signal transmission and horn/strobe evacuation.
- C. Automatic sensitivity control of certain smoke detectors.
- D. All components provided shall be listed for use with the selected system.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one or more of the following devices and systems:
 - 1. Manual stations.
 - 2. Heat detectors.
 - 3. Smoke detectors.
 - 4. Duct smoke detectors.
- B. Fire-alarm signal shall initiate the following actions:
 - 1. Continuously operate alarm notification appliances.
 - 2. Identify alarm and specific initiating device at fire-alarm control unit, connected network control panels, off-premises network control panels, and remote annunciators.
 - 3. Transmit an alarm signal to the remote alarm receiving station.
 - 4. Unlock electric door locks in designated egress paths.

5. Release fire and smoke doors held open by magnetic door holders.
6. Activate voice/alarm communication system.
7. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
8. Activate smoke-control system (smoke management) at firefighters' smoke-control system panel.
9. Close smoke dampers in air ducts of designated air-conditioning duct systems.
10. Activate preaction system.
11. Recall elevators to primary or alternate recall floors.
12. Activate elevator power shunt trip.
13. Activate emergency lighting control.
14. Activate emergency shutoffs for gas and fuel supplies.
15. Record events in the system memory.
16. Record events by the system printer.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:

1. Valve supervisory switch.
2. Elevator shunt-trip supervision.
3. Fire pump running.
4. Fire-pump loss of power.
5. Fire-pump power phase reversal.
6. User disabling of zones or individual devices.
7. Loss of communication with any panel on the network.

D. System trouble signal initiation shall be by one or more of the following devices and actions:

1. Open circuits, shorts, and grounds in designated circuits.
2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
4. Loss of primary power at fire-alarm control unit.
5. Ground or a single break in internal circuits of fire-alarm control unit.
6. Abnormal ac voltage at fire-alarm control unit.
7. Break in standby battery circuitry.
8. Failure of battery charging.
9. Abnormal position of any switch at fire-alarm control unit or annunciator.

E. System Supervisory Signal Actions:

1. Initiate notification appliances.
2. Identify specific device initiating the event at fire-alarm control unit, connected network control panels, off-premises network control panels, and remote annunciators.
3. Record the event on system printer.
4. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.
5. Transmit system status to building management system.

2.3 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Fire-alarm control unit and raceways shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.4 FIRE-ALARM CONTROL UNIT

- 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. Fire-Lite Alarms.
 2. GAMEWELL.
 3. Notifier.
 4. Siemens Industry, Inc.; Fire Safety Division.
 5. Silent Knight.
 6. SimplexGrinnell LP.
 7. Or equal.
- B. General Requirements for Fire-Alarm Control Unit:
1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864.
 - a. System software and programs shall be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining the information through failure of primary and secondary power supplies.
 - b. Include a real-time clock for time annotation of events on the event recorder and printer.
 - c. Provide communication between the FACP and remote circuit interface panels, annunciators, and displays.
 - d. The FACP shall be listed for connection to a central-station signaling system service.
 - e. Provide nonvolatile memory for system database, logic, and operating system and event history. The system shall require no manual input to initialize in the event of a complete power down condition. The FACP shall provide a minimum 500-event history log.
 2. Addressable Initiation Device Circuits: The FACP shall indicate which communication zones have been silenced and shall provide selective silencing of alarm notification appliance by building communication zone.
 3. Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: The FACP shall be listed for releasing service.

- C. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
 - 1. Annunciator and Display: Liquid-crystal type, two line(s) of 80 characters, minimum.
 - 2. Keypad: Arranged to permit entry and execution of programming, display, and control commands and to indicate control commands to be entered into the system for control of smoke-detector sensitivity and other parameters.

- D. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:
 - 1. Pathway Class Designations: NFPA 72, Class B.
 - 2. Pathway Survivability: Level 1.
 - 3. Install no more than 50 addressable devices on each signaling-line circuit.
 - 4. Serial Interfaces:
 - a. One dedicated RS 485 port for central-station operation using point IDDDACT.
 - b. One RS 485 port for remote annunciators, Ethernet module, or multi-interface module (printer port).
 - c. One USB port for PC configuration.
 - d. One RS 232 port for VESDA HLI connection.
 - e. One RS 232 port for voice evacuation interface.

- E. Smoke-Alarm Verification:
 - 1. Initiate audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.
 - 2. Activate an approved "alarm-verification" sequence at fire-alarm control unit and detector.
 - 3. Record events by the system printer.
 - 4. Sound general alarm if the alarm is verified.
 - 5. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.

- F. Notification-Appliance Circuit:
 - 1. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.
 - 2. Where notification appliances provide signals to sleeping areas, the alarm signal shall be a 520-Hz square wave with an intensity 15 dB above the average ambient sound level or 5 dB above the maximum sound level, or at least 75 dBA, whichever is greater, measured at the pillow.
 - 3. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.

- G. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke-barrier walls shall be connected to fire-alarm system.

- H. Printout of Events: On receipt of signal, print alarm, supervisory, and trouble events. Identify zone, device, and function. Include type of signal (alarm, supervisory, or trouble) and date and time of occurrence. Differentiate alarm signals from all other printed indications. Also print system reset event, including same information for device, location, date, and time. Commands initiate the printing of a list of existing alarm, supervisory, and trouble conditions in the system and a historical log of events.

- I. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory and digital alarm communicator transmitters shall be powered by 24-V dc source.

1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.
- J. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
1. Batteries: Sealed lead calcium.
- K. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.5 PREACTION SYSTEM

- A. Initiate Presignal Alarm: This function shall cause an audible and visual alarm and indication to be provided at the FACP. Activation of an initiation device connected as part of a preaction system shall be annunciated at the FACP only, without activation of the general evacuation alarm.

2.6 MANUAL FIRE-ALARM BOXES

- 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. Fire-Lite Alarms.
 2. GAMEWELL.
 3. Notifier.
 4. Siemens Industry, Inc.; Fire Safety Division.
 5. Silent Knight.
 6. SimplexGrinnell LP.
 7. Or equal.
- B. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
1. Single-action mechanism, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
 2. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
 3. Station Reset: Key- or wrench-operated switch.
 4. Indoor Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.
 5. Weatherproof Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.

2.7 SYSTEM SMOKE DETECTORS

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. Fire-Lite Alarms.
2. GAMEWELL.
3. Gentex Corporation.
4. Notifier.
5. Siemens Industry, Inc.; Fire Safety Division.
6. Silent Knight.
7. SimplexGrinnell LP.
8. System Sensor.
9. Or equal.

B. General Requirements for System Smoke Detectors:

1. Comply with UL 268; operating at 24-V dc, nominal.
2. Detectors shall be two-wire type.
3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
6. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.

C. Photoelectric Smoke Detectors:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).

D. Ionization Smoke Detector:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).

- E. Duct Smoke Detectors: Photoelectric type complying with UL 268A.
1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
 2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).
 3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector for smoke detection in HVAC system ducts.
 4. Each sensor shall have multiple levels of detection sensitivity.
 5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
 6. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.

2.8 HEAT DETECTORS

- 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. Fire-Lite Alarms.
 2. GAMEWELL.
 3. Gentex Corporation.
 4. Notifier.
 5. Siemens Industry, Inc.; Fire Safety Division.
 6. Silent Knight.
 7. SimplexGrinnell LP.
 8. System Sensor.
 9. Or equal.
- B. General Requirements for Heat Detectors: Comply with UL 521.
1. Temperature sensors shall test for and communicate the sensitivity range of the device.
- C. Heat Detector, Combination Type: Actuated by either a fixed temperature or Insert temperature or a rate of rise that exceeds 15 deg F (8 deg C) per minute unless otherwise indicated.
1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
- D. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 deg F (88 deg C).
1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

2.9 NOTIFICATION APPLIANCES

- 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. Gentex Corporation.
2. Siemens Industry, Inc.: Fire Safety Division.
3. SimplexGrinnell LP.
4. System Sensor.
5. Or equal.

B. General Requirements for Notification Appliances: Individually addressed, connected to a signaling-line circuit, equipped for mounting as indicated, and with screw terminals for system connections.

C. General Requirements for Notification Appliances: Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.

D. Chimes, Low-Level Output: Vibrating type, 75-dBA minimum rated output.

E. Chimes, High-Level Output: Vibrating type, 81-dBA minimum rated output.

F. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn, using the coded signal prescribed in UL 464 test protocol.

G. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.

1. Rated Light Output:
 - a. 15/30/75/110 cd, selectable in the field.
2. Mounting: Wall mounted unless otherwise indicated.
3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
4. Flashing shall be in a temporal pattern, synchronized with other units.
5. Strobe Leads: Factory connected to screw terminals.
6. Mounting Faceplate: Factory finished, red.

2.10 REMOTE ANNUNCIATOR

A. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.

1. Mounting: Flush cabinet, NEMA 250, Type 1.

B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

2.11 ADDRESSABLE INTERFACE DEVICE

A. General:

1. Include address-setting means on the module.
2. Store an internal identifying code for control panel use to identify the module type.
3. Listed for controlling HVAC fan motor controllers.

B. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.

C. Integral Relay: Capable of providing a direct signal to circuit-breaker shunt trip for power shutdown.

1. Allow the control panel to switch the relay contacts on command.
2. Have a minimum of two normally open and two normally closed contacts available for field wiring.

D. Control Module:

1. Operate notification devices.
2. Operate solenoids for use in sprinkler service.

2.12 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632.

B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture two telephone line(s) and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.

C. Local functions and display at the digital alarm communicator transmitter shall include the following:

1. Verification that both telephone lines are available.
2. Programming device.
3. LED display.
4. Manual test report function and manual transmission clear indication.
5. Communications failure with the central station or fire-alarm control unit.

D. Digital data transmission shall include the following:

1. Address of the alarm-initiating device.
2. Address of the supervisory signal.
3. Address of the trouble-initiating device.
4. Loss of ac supply.
5. Loss of power.
6. Low battery.
7. Abnormal test signal.
8. Communication bus failure.

- E. Secondary Power: Integral rechargeable battery and automatic charger.
- F. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

2.13 NETWORK COMMUNICATIONS

- A. Provide network communications for fire-alarm system according to fire-alarm manufacturer's written requirements.
- B. Provide network communications pathway per manufacturer's written requirements and requirements in NFPA 72 and NFPA 70.
- C. Provide integration gateway using BACnet for connection to building automation system.

2.14 SYSTEM PRINTER

- A. Printer shall be listed and labeled as an integral part of fire-alarm system.

2.15 DEVICE GUARDS

- A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.
 - 1. Factory fabricated and furnished by device manufacturer.
 - 2. Finish: Paint of color to match the protected device.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.
 - 1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.
- B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."
 - 1. Devices placed in service before all other trades have completed cleanup shall be replaced.

2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.
- B. Equipment Mounting: Install fire-alarm control unit on finished floor.
1. Comply with requirements for seismic-restraint devices per manufacturer's recommendation.
- C. Install wall-mounted equipment, with tops of cabinets not more than 78 inches (1980 mm) above the finished floor.
1. Comply with requirements for seismic-restraint devices per manufacturer's recommendation.
- D. Manual Fire-Alarm Boxes:
1. Install manual fire-alarm box in the normal path of egress within 60 inches (1520 mm) of the exit doorway.
 2. Mount manual fire-alarm box on a background of a contrasting color.
 3. The operable part of manual fire-alarm box shall be between 42 inches (1060 mm) and 48 inches (1220 mm) above floor level. All devices shall be mounted at the same height unless otherwise indicated.
- E. Smoke- or Heat-Detector Spacing:
1. Comply with the "Smoke-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
 2. Comply with the "Heat-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
 3. Smooth ceiling spacing shall not exceed 30 feet (9 m).
 4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Annex A in NFPA 72.
 5. HVAC: Locate detectors not closer than 36 inches (910 mm) from air-supply diffuser or return-air opening.
 6. Lighting Fixtures: Locate detectors not closer than 12 inches (300 mm) from any part of a lighting fixture and not directly above pendant mounted or indirect lighting.
- F. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.
- G. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches (9100 mm) long shall be supported at both ends.
1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.
- H. Single-Station Smoke Detectors: Where more than one smoke alarm is installed within a dwelling or suite, they shall be connected so that the operation of any smoke alarm causes the alarm in all smoke alarms to sound.
- I. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.

- J. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.
- K. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches (150 mm) below the ceiling. Install all devices at the same height unless otherwise indicated.
- L. Device Location-Indicating Lights: Locate in public space near the device they monitor.

3.3 PATHWAYS

- A. Pathways above recessed ceilings and in nonaccessible locations may be routed exposed.
 - 1. Exposed pathways located less than 96 inches (2440 mm) above the floor shall be installed in EMT.
- B. Pathways shall be installed in EMT.
- C. Exposed EMT shall be painted red enamel.

3.4 CONNECTIONS

- A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Section 087100 "Door Hardware." Connect hardware and devices to fire-alarm system.
 - 1. Verify that hardware and devices are listed for use with installed fire-alarm system before making connections.
- B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches (910 mm) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
 - 1. Alarm-initiating connection to smoke-control system (smoke management) at firefighters' smoke-control system panel.
 - 2. Smoke dampers in air ducts of designated HVAC duct systems.
 - 3. Alarm-initiating connection to activate emergency lighting control.
 - 4. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.
 - 5. Supervisory connections at valve supervisory switches.
 - 6. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.
 - 7. Data communication circuits for connection to building management system.
 - 8. Data communication circuits for connection to mass notification system.
 - 9. Supervisory connections at fire-extinguisher locations.
 - 10. Supervisory connections at fire-pump power failure including a dead-phase or phase-reversal condition.
 - 11. Supervisory connections at fire-pump engine control panel.

3.5 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- B. Install framed instructions in a location visible from fire-alarm control unit.

3.6 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
- B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.7 FIELD QUALITY CONTROL

- A. Field tests shall be witnessed by authorities having jurisdiction.
- B. Perform tests and inspections.
- C. Perform the following tests and inspections:
 - 1. Visual Inspection: Conduct visual inspection prior to testing.
 - a. Inspection shall be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
 - 2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
 - 4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
 - 5. Test visible appliances for the public operating mode according to manufacturer's written instructions.
 - 6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
- D. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- E. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

- G. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
- H. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.8 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 1. Include visual inspections according to the "Visual Inspection Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 2. Perform tests in the "Test Methods" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 3. Perform tests per the "Testing Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

3.9 SOFTWARE SERVICE AGREEMENT

- A. Comply with UL 864.
- B. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.
- C. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.
 - 1. Upgrade Notice: At least 30 days to allow Owner to schedule access to system and to upgrade computer equipment if necessary.

END OF SECTION

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SECTION 31 00 00

TEMPORARY EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Prevention of erosion due to construction activities.
- B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.
- C. Restoration of areas eroded due to insufficient preventive measures.
- D. Performance bond.
- E. Compensation to District or City for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

1.2 RELATED DOCUMENTS

- A. Section 31 10 00 – Site Clearing: (Inlet protection).
- B. Section 31 20 00 – Earthwork: (Permanent grade changes for erosion control).
- C. Erosion Control Plans.

1.3 REFERENCES

- A. ASTM D 3786 - Standard Test Method for Hydraulic Bursting Strength of Textile Fabrics- Diaphragm Bursting Strength Tester Method
- B. ASTM D 4355 - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc Type Apparatus; 2002
- C. ASTM D 4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity; 1999a.
- D. ASTM D 4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles; 1991 (Reapproved 1996).
- E. ASTM D 4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile; 1999a.
- F. EPA 832-R-92-005 - Storm Water Management for Construction Activities; U.S. Environmental Protection Agency; 1992.
- G. California Storm Water Quality Association (CASQA) – BMP Construction Handbook (2009).
- H. The City of San Diego Storm Water Standards Manual, January 14, 2011.

1.4 PERFORMANCE REQUIREMENTS

- A. Comply with all requirements of U.S. Environmental Protection Agency for erosion and sedimentation control.
- B. Best Management Practices Standard: EPA 832-R-92-005.
- C. Best Management Practices Standard: CASQA Best Management Practices Construction Handbook.
- D. Follow Water Pollution Control Plan (WPCP) requirements and enforce as required throughout the construction schedule. Verify on a weekly basis (or as noted in the WPCP) that the requirements of the WPCP are in place and enforced to protect the applicable site.

- E. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.
- F. Provide to District or City (if required by governing district or City) a Performance Bond covering erosion and sedimentation preventive measures only, in an amount equal to 110 percent of the cost of erosion and sedimentation control work.
- G. Timing: Put preventive measures in place as noted in the WPCP and/or The City of San Diego Storm Water Standards Manual.
- H. Storm Water Runoff: Control increased storm water runoff due to construction activities for this project.
 - 1. Prevent runoff from directly entering storm drain and associated structures. Use gravel or sand bags, fiber rolls or other suitable measures as shown on the erosion control plans and WPCP.
- I. Erosion on Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
 - 1. Control movement of sediment and soil from temporary stockpiles of soil.
 - 2. Prevent development of ruts due to equipment and vehicular traffic.
 - 3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to governing District or City. Comply with provisions outlined in the WPCP and The City of San Diego Storm Water Standards Manual at all times.
- J. Erosion off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
 - 1. Prevent windblown soil from leaving the project site.
 - 2. Prevent tracking of mud onto public roads outside site.
 - 3. Prevent mud and sediment from flowing onto sidewalks and pavements.
 - 4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to governing District or City. Comply with provisions outlined in the WPCP and The City of San Diego Storm Water Standards Manual at all times.
- K. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
 - 1. If sedimentation occurs, install or correct preventive measures immediately at no cost to District or City; remove deposited sediments; comply with requirements of authorities having jurisdiction.
- L. Open Water: Prevent standing water that could become stagnant.
- M. Maintenance: Maintain temporary preventive measures until permanent measures have been established. Comply with provisions outlined in the WPCP and The City of San Diego Storm Water Standards Manual at all times.
- N. Best Management Practices Standard: California Storm Water Quality Association (CASQA) – BMP Construction Handbook (2009).

PART 2 PRODUCTS

2.1 MATERIALS

- A. Gravel bags:
 - 1. Bags should be woven polypropylene, polyethylene or polyamide fabric or burlap, minimum unit weight of 4 ounces/yd², Mullen burst strength exceeding 300 lb/in² in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355.

2. Each gravel-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and weight of approximately 33 lbs. Bag dimensions are nominal, and may vary based on locally available materials.
 3. Fill material should be 0.5 to 1 in. gravel, clean and free from clay, organic matter, and other deleterious material.
- B. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:
1. Average Opening Size: 30 U.S. Std. Sieve, maximum, when tested in accordance with ASTM D 4751.
 2. Permittivity: 0.05 sec^{-1} , minimum, when tested in accordance with ASTM D4491.
 3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D 4355 after 500 hours exposure.
 4. Tensile Strength: 100 lb-f, minimum, in cross-machine direction; 124 lb-f, minimum, in machine direction; when tested in accordance with ASTM D 4632.
 5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D 4632.
 6. Tear Strength: 55 lb-f, minimum, when tested in accordance with ASTM D4533.
 7. Color: Manufacturer's standard, with embedment and fastener lines preprinted.
- C. Fiber rolls: Either prefabricated rolls or rolled tubes of erosion control blanket.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible. Comply with provisions outlined in the WPCP and The City of San Diego Storm Water Standards Manual at all times.

3.2 PREPARATION

- A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

3.3 SCOPE OF PREVENTIVE MEASURES

- A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.
- B. Construction Entrances: Traffic-bearing aggregate surface with corrugated steel shaker plates.
- C. Linear Sediment Barriers: Made of silt fences, fiber rolls, or gravel bags as indicated.
- D. Storm Drain Catch Basins: Protect each inlet or catch basin using one of the following measures:
 1. Gravel bags placed as indicated.
 2. Fiber rolls in according to the manufacturer's recommendations.
- E. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downspout outlets and storm water outlets.
- F. Soil Stockpiles: Protect using one of the following measures:
 1. Cover with polyethylene film, secured by placing soil on outer edges.
 2. Cover with mulch at least 4 inches thickness of pine needles, sawdust, bark, wood chips, or shredded leaves, or 6 inches of straw or hay.
- G. Temporary Seeding: Use where temporary vegetated cover is required.

3.4 INSTALLATION

- A. Traffic-Bearing Aggregate Surface:
 - 1. Excavate minimum of 12 inches.
 - 2. Place and compact at least 12 inches of greater than 3-inch but smaller than 6-inch crushed aggregate.
- B. Silt Fences: Install as indicated.
- C. Temporary Seeding:
 - 1. When hydraulic seeder is used, seedbed preparation is not required.
 - 2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.
 - 3. If temporary mulching was used on planting area but not removed, apply nitrogen fertilizer at 1 pound per 1000 sq ft.
 - 4. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 12 to 16 pounds per 1000 sq ft.
 - 5. Incorporate fertilizer into soil before seeding.
 - 6. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch deep.
 - 7. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.
 - 8. Repeat irrigation as required until grass is established.

3.5 MAINTENANCE

- A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches or more rainfall at the project site, and daily during prolonged rainfall. Comply with provisions outlined in the WPCP and The City of San Diego Storm Water Standards Manual at all times.
- B. Repair deficiencies immediately.
- C. Silt Fences:
 - 1. Promptly replace fabric that deteriorates unless need for fence has passed.
 - 2. Remove silt deposits that exceed one-third of the height of the fence.
 - 3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.
- D. Gravel Bags:
 - 1. Promptly replace bags that fall apart or otherwise deteriorate unless need has passed.
 - 2. Remove silt deposits that exceed one-half of the height of the bags.
 - 3. Repair bag rows that are undercut by runoff or otherwise damaged, whether by runoff or other causes.
- E. Place sediment in appropriate locations on site; do not remove from site.

3.6 CLEAN UP

- A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by City.
- B. Clean out temporary sediment control structures that are to remain as permanent measures.
- C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

3.7 ENFORCEMENT

- A. Any fines levied against the City for non-compliance of Best Management Practices by agencies having jurisdiction over enforcement shall be paid by the Contractor. Remedial action for violations shall be immediate and to the satisfaction of the enforcing agency to avoid construction delays.

END OF SECTION

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SECTION 31 10 00

SITE CLEARING

PART 1 GENERAL

1.1 SUMMARY

This Section covers the requirements for site clearing, including clearing and grubbing, rubbish removal, stockpiled debris, sawcutting, demolition and removal of existing asphalt and concrete pavements, existing curb and gutter, onsite abandoned utilities and other items as shown on the plans and as specified below in preparation for earthwork operations.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A. Standard Specifications:

1. Standard Specifications for Public Works Construction (2012 Edition), "Greenbook", including the latest edition of the City of San Diego Regional Standard Specifications for Public Works Construction (Whitebook) 2012 Edition.

B. Standard Drawings:

1. City of San Diego Standard Drawings for Public Works Construction, 2012 Edition.

1.3 DESCRIPTION

The work includes clearing and grubbing as defined in Sections 300-1.1, 300-1.2, and 300-1.3 of the Greenbook Standard Specifications. Existing vegetation, shrubs, and other items within the area of work shall be removed under this item of work.

1.4 SITE INSPECTION AND LOCATION OF EXISTING ON-SITE UTILITIES:

Prior to all work of this Section, carefully inspect the entire site and all existing items to be demolished and removed or to be left intact, and determine an orderly sequence for the performance of this work. Exact locations and alignment of existing buried utility lines are not known. Locate all existing utility lines and determine the requirements for connection/disconnection, capping or removal. Locate all active utilities traversing the area of work to be retained and determine the requirements for protection. Locate all points of connection and crossings by potholes and determine exact horizontal and vertical location prior to commencing the work.

The Contractor is responsible to accurately locate, by potholing or other suitable methods, all existing utilities and substructures as shown on the plans and marked out by Underground Service Alert (USA), to prevent damage to such facilities and to identify any conflicts with the proposed work.

There will be no other compensation for potholing at any specific location required by the plans. Neither will showing some specific locations on the plans relieve the Contractor of the responsibility to pothole as previously mentioned in this Subsection.

The Contractor shall notify the engineer in writing of any conflicts between existing utilities and the proposed work a minimum of five (5) working days prior to commencement of construction activities.

The written notification shall include; date of utility location, method of utility location, type, size, and material of utility, horizontal location (to the nearest station), depth from existing pavement or ground surface to top and bottom of utility, suspected ownership of utility, and the date on which any conflict with the utility will impact the Critical Path.

For existing utilities shown on the plans or marked out by USA, the Contractor shall not be entitled to an extension of contract time or compensation for delay if direction is provided by the Engineer within five (5) working days from receipt of the Contractor's written notification of the utility conflict. If the Engineer does not provide direction to the Contractor within the five (5) working days, an extension of contract time may be granted in accordance with Greenbook and Whitebook Section 6-6.2 beginning on the sixth (6th) working day after receipt of the Contractor's written notification.

1.5 PROTECTION

- A. The Contractor shall notify Dig Alert at 1-800-422-4133 at least two days prior to starting work and shall coordinate all work with utility company representatives. The existence and locations of existing underground facilities shown on the drawings were obtained from a search of available records. The Contractor shall take precautionary measures to protect any existing facility shown on the drawings, and any other which is not of record or not shown on the drawings.
- B. Dewatering: Provide for the disposal of surface and subsurface water which may accumulate in open excavations, unfinished fills, or other low areas. Remove water by trenching where approved, pumping, or other methods to prevent softening of exposed surfaces. Surface dewatering plan shall include the rerouting of any storm water runoff or natural drainage, if necessary, and shall comply with requirements of the **city/county** and the California State Water Resource Control Board.
- C. Protection and Restoration of Surface: Protect newly graded areas from traffic, erosion, and settlements. Repair and reestablish damaged or eroded slopes, elevations or grades and restore surface construction prior to acceptance. Provide erosion control to prevent water-borne soil from leaving the work area by means of straw bale dikes or sand bags. The Contractor shall be responsible to clean up any soil deposited in the public right-of-way or on adjacent property. The Contractor shall be responsible to protect storm drain catch basins with sand bags and to prevent sediment from entering the storm drain system during construction.

1.6 RELATED WORK IN OTHER SECTIONS

The following work specified in other sections applies to the work of this Section, including but not limited to:

- A. Div 1 as if fully repeated here in.
- B. Division 32 and 33.

1.7 SAFETY DURING CONSTRUCTION

The Contractor shall assume sole and complete responsibility for job site conditions during the course of construction of the project, including safety of all persons and property. This requirement shall be made to apply continuously and not be limited to normal working hours. Refer to Part Three of this Section and Division 1 for additional requirements

PART 2 PRODUCTS

Not applicable to this section.

PART 3 EXECUTION

3.1 GENERAL

- A. Perform all clearing and grubbing as defined in Section 300-1.1, 300-1.2, and 300-1.3 of the Greenbook Standard Specifications for Public Works Construction and as described in this Section.
- B. Coordinate clearing and grubbing with the requirements of Div 31, "Earthwork for Structures and Pavement".
- C. The Contractor shall protect existing improvements and landscape outside the limits of work.
- D. The Contractor shall exercise care to avoid damage to existing improvement store main.
- E. The Contractor shall take all means to avoid the spread of dust to adjacent property or the public right-of-way. The Contractor shall be responsible for street sweeping and cleaning of the public right-of-way and adjacent property.
- F. Provide weather protection during the construction period to prevent erosion or sedimentation onto the public right-of-way or adjacent property.
- G. Prior to all work of this section, carefully inspect the entire site and all existing items to be demolished and removed or to be left intact, and determine an orderly sequence for the performance of this portion of the work. Locate all existing utility lines and determine the requirements for disconnection and capping. Locate all active utilities traversing the area of work to be retained and determine the requirements for protection.
- H. Disconnection and protection of utilities: Preserve in operating condition all active utilities traversing the site and servicing adjacent structures. Protect all property including, but not necessarily limited to mains, manholes, catch basins, valve boxes, poles, guys, and other appurtenances.

END OF SECTION

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SECTION 31 20 00

EARTHWORK FOR STRUCTURES AND PAVEMENTS

PART 1 GENERAL

1.1 SUMMARY

This Section covers the requirements for earthwork including remedial grading, cut and fill operations and materials, removal of unsuitable soils, import of select soil materials, disposition of onsite unsatisfactory material and debris. It is the responsibility of the Contractor to provide adequate equipment and methods to accomplish the work in accordance with these specifications unless more stringent requirements required in the geotechnical report and any applicable grading codes and local agency ordinances.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A. Standard Specifications:

1. Standard Specifications for Public Works Construction (2012 Edition), "Greenbook", including the latest edition of the City of San Diego Regional Standard Specifications for Public Works Construction (Whitebook) 2012 Edition.

B. Ninyo & Moore Updated Geotechnical Evaluation, Fire Station 22, 1055 Catalina Boulevard, San Diego, California, Project No. 106297001, report dated March 11, 2011, and Ninyo & Moore, Supplemental Information for the Updated Geotechnical Evaluation, Fire Station 22, 1055 Catalina Boulevard, San Diego, California, Project No. 106297003, report dated March 6, 2015."

C. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM D1556 (1990) Density and Unit Weight of Soil in Place by the Sand-Cone Method
- ASTM D1557 (1991) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb f/ft (2,700 kN -m/m))
- ASTM D2487 (1993) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- ASTM D2922 (1991) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

1.3 DESCRIPTION

The proposed earthwork includes performing site preparation, remedial grading, excavation, removal of unsuitable soils, importing select soil materials (if required), filling, backfilling, compacting, and finished grading necessary to construct the finished grades indicated for structures, pavements, and other on-grade slabs or site work. The Contractor shall provide survey services as specified herein. Requirements for excavating and backfilling for utility lines or storm drains are contained in Section 31 22 50, "Excavation, Backfilling, and Compacting for Utilities". Requirements for pavement base course and surface courses as well as for foundation and footing construction are specified in the respective sections for these systems.

1.4 DEFINITIONS

- A. Backfill: Material used in refilling a cut or other excavation.
- B. Capillary Water Barrier: A layer of clean, poorly graded crushed rock stone, or natural sand or gravel having a high porosity which is placed beneath a building slab with or without a vapor barrier to cut off the capillary rise of pore water to the area immediately below a slab.
- C. "Soil" Fills: Soil fills are defined as fills containing no rocks or hard lumps larger than 6" in maximum dimensions and containing at least 40% by weight of material smaller than 3/4" in size.
- D. Compaction: The process of mechanically stabilizing a material by increasing its density at a controlled moisture condition. "Degree of Compaction" is expressed as a percentage of the maximum density obtained by the test procedure described in ASTM D-1557 for general soil types abbreviated in this specification as "(amount indicated)% ASTM D-1557 maximum density".
- E. Embankment: A "fill" having a top that is higher than adjoining ground.
- F. Excavation: The removal of soil, rock or hard material to obtain a specified depth or elevation.
- G. Fill: Specified material placed at a specified degree of compaction to obtain an indicated grade or elevation.
- H. Lift: A layer (or course) of soil placed on top of a previously prepared or placed soil in a fill or embankment.
- I. Soil: The loose surface material of the earth's crust resulting from the chemical and mechanical weathering of rock and organic material.
- J. Subgrade: The bottom layer of material (sometimes in-situ soils or rock) graded or otherwise prepared for supporting the addition of fill material, pavement courses, or building footings and slabs.
- K. Unsatisfactory Material: Existing, in-place soil or other material which can be identified as having insufficient strength characteristics or stability to carry intended loads in fill or embankment without excessive consolidation or loss of stability. Materials classified as PT, OH, or OL by ASTM D-2487 are unsatisfactory. Unsatisfactory materials also include existing undocumented fill soils, any expansive clays, decomposable or organic debris, rubber tires, metal and plastic. Expansive soils are soils with an expansive index greater than 30 when tested by UBC Test Standard 29-2.
- L. Debris: Existing materials such as asphalt, concrete, glass and other non-organic items that are present in some on-site fill areas.
- M. Remedial Grading: Over excavation, removal and/or re-compaction of existing soils under proposed improvements.

1.5 DELIVERY AND STORAGE

Deliver and store materials in a manner to prevent contamination or segregation.

1.6 SITE INSPECTION AND LOCATION OF EXISTING ON-SITE UTILITIES:

Prior to all work of this Section, carefully inspect the entire site and all existing items to be demolished and removed or to be left intact, and determine an orderly sequence for the performance of this work. Exact locations and alignment of existing buried utility lines are not known. Locate all existing utility lines and determine the requirements for disconnection and capping. Locate all active utilities traversing the area of work to be retained and determine the requirements for protection. Locate all points of connection and crossings by potholes and determine exact horizontal and vertical location prior to commencing the work. Requirements for site clearing are contained in Section 31 10 00, "Site Clearing".

1.7 PROTECTION

A. The Contractor shall notify Dig Alert at 1-800-422-4133 at least two days prior to starting work and shall coordinate all work with utility company representatives. The existence and locations of existing underground facilities shown on the drawings were obtained from a search of available records. The Contractor shall take precautionary measures to protect any existing facility shown on the drawings, and any other which is not of record or not shown on the drawings.

B. Shoring: The California Division Occupational Safety and Health Enforces the requirement that building and construction contractors obtain a permit prior to commencing certain types of hazardous activity, as specified in Section 65000 of the State Labor Code and Section 341 of Title 8 of the California Code of Regulations. These activities include construction of trenches or excavations which are 5' or deeper and into which a person is required to descend, the construction or demolition of any building, structure, falsework, or scaffolding more than three stories high or the equivalent height, and the underground use of diesel engines in work in mines and tunnels. Construction permits are issued by district offices of the division. The San Diego office is located at:

State of California
Department of Industrial Relations
Division of Occupational Safety and Health
7575 Metropolitan Drive, Suite 207
San Diego, CA 92108
(619) 767-2280

C. Dewatering: Provide for the disposal of surface and subsurface water which may accumulate in open excavations, unfinished fills, or other low areas. Remove water by trenching where approved, pumping, or other methods to prevent softening of exposed surfaces. Surface dewatering plan shall include the rerouting of any storm water runoff or natural drainage, if necessary, and shall comply with requirements of the **City/County** and the San Diego Regional Water Quality Control Board.

E. Protection and Restoration of Surface: Protect newly graded areas from traffic, erosion, and settlements. Repair and reestablish damaged or eroded slopes, elevations or grades and restore surface construction prior to acceptance. Provide erosion control to prevent water-borne soil from leaving the work area by means of straw bale dikes or sand bags. The Contractor shall be responsible to clean up any soil deposited in the public right-of-way or on adjacent property. The Contractor shall be responsible to protect storm drain catch basins with sand bags and to prevent sediment from entering the storm drain system during construction.

1.8 RELATED WORK IN OTHER SECTIONS

The following work specified in other sections applies to the work of this Section, including but not limited to:

- A. Div 1 as if fully repeated here in.
- B. Div 32.

1.9 SAFETY DURING CONSTRUCTION

The Contractor shall assume sole and complete responsibility for job site conditions during the course of construction of the project, including safety of all persons and property. This requirement shall be made to apply continuously and not be limited to normal working hours. Refer to Part Three of this Section and Division 1 for additional requirements.

PART 2 PRODUCTS

2.1 MATERIALS

- A. On-site soils: The on-site soils consist of pavement subgrade and existing conditions **per the geotechnical report located in the appendix of this Technical Specifications.** Materials and methods utilized in this project shall be as follows unless more restrictive materials are specified in the **geotechnical report or the civil drawings.**
- B. Select Granular Import Soils: **see geotechnical report**
- C. Material to be placed as fill shall be sufficiently free of organic matter and other deleterious substances, and shall be evaluated by the Geotechnical Engineer prior to placement. Soils of poor gradation, expansion or strength characteristics shall be placed as recommended by the Geotechnical consultant or mixed with other soils to achieve satisfactory fill material.
- D. Oversize Material: Oversize material, defined as rock or other irreducible material with a dimension of 6" or larger, shall not be buried or placed in shallow fills. Material greater than 3" in maximum dimension shall not be placed in top 12-inches of pavement subgrade.

PART 3 EXECUTION

3.1 SITE PREPARATION

Prior to grading, the site shall be cleared of surface and subsurface obstructions, including any existing debris, and stripped of vegetation in accordance with Section 31 10 00, "Site Clearing". Removed vegetation and debris shall be disposed of off site. Holes resulting from removal of buried obstructions which extend below finish grades shall be replaced with suitable compacted fill material. All areas to receive fill and/or other near surface improvements shall be scarified to a minimum depth of 8-inches, moisture conditioned, to or near optimum moisture conditions, and recompacted to a minimum of 90% relative compaction, based on ASTM Test Method D1557-91.

3.2 REMEDIAL GRADING

- A. Under Building: The building footprint and area **5-feet** beyond the building shall be overexcavated as described in Section 7.3 of the referenced geotechnical report (for shallow foundations). The exposed subgrade shall be observed by the Geotechnical Engineer and any additional recommendations made. Scarify and recompact subgrade prior to placing fill. Place fill in 8 inch maximum lifts and compact to 90% relative compaction per ASTM D 1557-91. Existing site soils may be reused as compacted fill if they meet requirements specified herein.
- B. Under Asphalt and Concrete Vehicle Pavement Areas: **see geotechnical report**
- C. Under Non – Vehicle Hardscape Areas: **see geotechnical report**
- D. Under Permeable Paving System: **see geotechnical report**

3.3 COMPACTION REQUIREMENTS

- A. Sub-grade soils: **see geotechnical report**

3.4 FINISH OPERATIONS

- A. Site Grading: Grade to finished grades indicated within 0.10 foot. Grade areas to drain water away from structures. Existing grades which are to remain but are disturbed by the Contractor's operations shall be restored as specified herein.
- B. Finishing Subgrades under Structures and Pavements: Finish the surface of the top lift of the fill or top of the subgrade to the elevation and cross section indicated. The finished surface shall be smooth and of uniform texture. Lightly scarify or blade the finished surface to bring the finished surface to within 0.05' of the indicated grade and to eliminate imprints made by the compaction and shaping equipment. The surface shall show no deviations in excess of 3/8" when tested with a 10' straightedge.

3.5 DISPOSITION OF SURPLUS MATERIAL

- A. Unsatisfactory Material and Debris: All unsatisfactory material and any debris material shall be removed from the site to a location approved by the City/County of San Diego.

3.6 PROTECTION OF SURFACES

Protect newly graded areas from traffic, erosion, and settlements that may occur. Repair or reestablish damaged grades, elevations, or slopes prior to acceptance of work.

3.7 SOIL TESTING

- A. Soil testing during construction shall be performed by a Geotechnical Testing Laboratory. Reference Div 1, "Testing" for specific requirements. Materials and operations under this Section shall be monitored by qualified Geotechnical Laboratory personnel under the direction of a Geotechnical Engineer. In general, no more than 1 foot of soil in vertical elevation shall be placed without at least one field density test being made within that interval. In addition, a minimum of one field density test shall be made for every 200 cubic yards of soil fill placed and compacted, unless directed otherwise by the Geotechnical Engineer.

- B. The Geotechnical Engineer shall make random field density tests of the compacted soil fill to provide a basis for expressing an opinion as to whether the fill material is compacted as specified. The basis for its opinion that the fill material has been compacted to at least the minimum relative compaction specified shall be that no tests in compacted or recompacted fill areas indicate a relative compaction of less than that specified. Density tests shall be made in the compacted materials below any disturbed surface. When these tests indicate that the density of any layer of fill or portion thereof is below that specified, the particular layer or areas represented by the test shall be reworked until the specified density has been achieved.
- C. Prior to placement of concrete, footing excavations and fill placement shall be observed and tested by the Geotechnical Engineer.
- D. The Contractor shall be responsible for any rework necessary to achieve the specified densities to the satisfaction of the Geotechnical Engineer.

3.8 SURVEY SERVICES

- A. The Contractor shall be responsible for procuring all surveying services as may be required for construction. All construction surveying services shall be provided by a licensed land surveyor or registered civil engineer licensed to practice landsurveying.
- B. Contractor will be required to hire a California licensed land surveyor to certify the building pad prior to foundation, slab placement, and related form work required by governing agency.

END OF SECTION

SECTION 31 22 50

EXCAVATING, BACKFILLING & COMPACTING FOR UTILITIES

PART 1 GENERAL

1.1 SUMMARY

This section includes requirements for excavating, preparation of pipe-laying surface, pipe bedding, backfilling and compaction for the piping systems furnished and installed under related Div 32.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A. Standard Specifications:

1. Standard Specifications for Public Works Construction (2012 Edition), "Greenbook", including the latest edition of the City of San Diego Regional Standard Specifications for Public Works Construction (Whitebook) 2012 Edition.

B. Standard Drawings:

1. City of San Diego Standard Drawings for Public Works Construction, 2012 Edition.

C. Ninyo & Moore Updated Geotechnical Evaluation, Fire Station 22, 1055 Catalina Boulevard, San Diego, California, Project No. 106297001, report dated March 11, 2011, and Ninyo & Moore, Supplemental Information for the Updated Geotechnical Evaluation, Fire Station 22, 1055 Catalina Boulevard, San Diego, California, Project No. 106297003, report dated March 6, 2015."

D. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM D1556 (1990) Density and Unit Weight of Soil in Place by the Sand-Cone Method
- ASTM D1557 (1991) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft (2,700 kN -m/m))
- ASTM D2487 (1993) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- ASTM D2922 (1991) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- ASTM D3017 (1988; R 1993) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

1.3 DESCRIPTION

The work includes excavation, preparation of pipe laying surface, pipe bedding, backfilling and compaction as specified herein, for the piping systems furnished and installed under related Divisions 32. The work also includes protection as specified herein, installation of buried warning and identification tape.

1.4 DEFINITIONS

- A. Backfill: Material used in refilling a trench or other excavation.
- B. Compaction: Any method of mechanically stabilizing a material by increasing its density at a controlled moisture condition. "Degree of Compaction" is expressed as a percentage of the maximum density obtained by the test procedure described in ASTM D1557 for general soil types, abbreviated in this specification as "(amount indicated)% ASTM D1557 maximum density."
- C. Embankment: A "fill having a top that is higher than adjoining ground."
- D. Fill: Specified material placed at a specified degree of compaction to obtain an indicated grade or elevation.
- E. Granular Pipe Bedding: Sand, gravel or crushed aggregate as indicated in referenced Standard Drawing.
- F. Hard Material: Weathered rock, dense consolidated deposits, or conglomerate materials which are not included in the definition of "rock" but which usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal.
- G. Lift: A layer or course of soil placed on top of prepared subgrade or a previously prepared or placed soil in a fill or backfill.
- H. Rock: Solid Homogenous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling and blasting, drilling and the use of expansion jacks or feather wedges, or the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or concrete other than pavement exceeding 1/2 cubic yard in volume.
- I. Unyielding Material: Rock or soil with cobbles in the trench bottom requiring a covering of finer grain material or special bedding to avoid bridging in the pipe or conduit.
- J. Unsatisfactory Material: Soil or other material identified as having insufficient strength or stability to carry intended loads on trench backfills without excessive consolidation or loss of stability. Also backfill material which contains refuse, large rocks, debris, and other Material which could damage the pipe or cause the backfill not to compact. Materials classified as PT, OH, or OL by ASTM D24-87 are unsatisfactory.
- K. Unstable Material: Material in the trench bottom which lacks firmness to maintain alignment and prevent joints from separating in the pipe, conduit or appurtenance structure during backfilling. This may be material otherwise identified as satisfactory which has been disturbed or saturated.

1.5 SUBMITTALS

- A. Field Test Reports: Submit within 14 days of test date.
- B. Shoring Plan: The Contractor shall submit a shoring plan prepared in accordance with applicable CAL-OSHA requirements to the Owner's representative for review prior to commencing the work.

1.6 SITE INSPECTION AND LOCATION OF EXISTING ON-SITE UTILITIES:

Prior to all work of this Section, carefully inspect the entire site and all existing items to be demolished and removed or to be left intact, and determine an orderly sequence for the performance of this work. Exact locations and alignment of existing buried utility lines are not known. Locate all existing utility lines and determine the requirements for disconnection and capping. Locate all active utilities traversing the area of work to be retained and determine the requirements for protection. Locate all points of connection and crossings by potholes and determine exact horizontal and vertical location prior to commencing the work.

1.7 PROTECTION

- A. The Contractor shall notify Dig Alert at 1-800-422-4133 at least two days prior to starting work and shall coordinate all work with utility company representatives. The existence and locations of existing underground facilities shown on the drawings were obtained from a search of available records. The Contractor shall take precautionary measures to protect any existing facility shown on the drawings, and any other which is not of record or not shown on the drawings.
- B. For all work related to water utilities, the Contractor shall coordinate all work with Water District.
- C. Shoring: The California Division Occupational Safety and Health Enforces the requirement that building and construction contractors obtain a permit prior to commencing certain types of hazardous activity, as specified in Section 65000 of the State Labor Code and Section 34-1 of Title 8 of the California Code of Regulations. These activities include construction of trenches or excavations which are 5' or deeper and into which a person is required to descend, the construction or demolition of any building, structure, falseworks or scaffolding more than three stories high or the equivalent height, and the underground use of diesel engines in work in mines and tunnels. Construction permits are issued by district offices of the division. The San Diego office is located at:

State of California
Department of Industrial Relations
Division of Occupational Safety and Health
7575 Metropolitan Drive, Suite 207
San Diego, CA 92108
(619) 767-2280

- 1. This project includes trenching in excess of 5 feet in depth which will require a permit from the California Division of Occupational Safety and Health (CAL-OSHA), The Contractor shall be responsible for obtaining the appropriate permit and shall comply with the requirements of the permit, and with CAL-OSHA law.

The Contractor shall submit a shoring plan prepared in accordance with applicable CAL-OSHA requirements, to the Owner's representative for review prior to commencing the work.

- D. Dewatering: Provide for the disposal of surface and subsurface water which may accumulate in open excavations, unfinished fills, or other low areas. Remove water by trenching where approved, pumping, or other methods to prevent softening of exposed surfaces. Surface dewatering plan shall include the rerouting of any storm water runoff or natural drainage, if necessary; and shall comply with requirements of the **City/County** and the California State Water Resource Board.
- E. Utilities: Movement of construction machinery and equipment over pipes and utilities during construction shall be at the Contractor's risk. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, use hand or light equipment excavation. Start hand or light equipment excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Support uncovered lines or other existing work affected by the contract excavation until backfill is completed. Report damage to any utility or subsurface improvements immediately to the Owner's Representative.
- F. Structures and Surfaces: Protect newly backfilled areas and adjacent structures, slopes or grades from traffic, erosion settlement, or any other damage. Repair and reestablish damaged or eroded grades and slopes and restore surface construction prior to acceptance. Provide erosion control to prevent water-borne soil from leaving the site, by means of straw bale dikes or sand bags. The Contractor shall be responsible to clean-up any soil deposited in the public right-of-way or on adjacent property.
- G. Protection and Restoration of Surface: Protect newly graded areas from traffic, erosion, and settlements. Repair and reestablish damaged or eroded slopes, elevations or grades and restore surface construction prior to acceptance. Provide erosion control to prevent water-borne soil from leaving the work area by means of straw bale dikes or sand bags. The Contractor shall be responsible to clean up any soil deposited in the public right-of-way or on adjacent property. The Contractor shall be responsible to protect storm drain catch basins with sand bags and to prevent sediment from entering the storm drain system during construction.

1.8 RELATED WORK IN OTHER SECTIONS

The following work specified in other sections applies to the work of this Section, including but not limited to:

- A Div 1 as if fully repeated herein.
- B. Div 32.

1.9 SAFETY DURING CONSTRUCTION

The Contractor shall assume sole and complete responsibility for job site conditions during the course of construction of the project, including safety of all persons and property. This requirement shall be made to apply continuously and not be limited to normal working hours. Refer to Part Three of this Section and Division 1 for additional requirements.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

Provide soil materials as described below free of debris, roots, wood, scrap material, vegetable matter, refuse, soft unsound particles, or other deleterious and objectionable materials. Materials and methods utilized in this project shall be as follows unless more restrictive materials are specified in the **geotechnical letter see appendix**.

- A. Backfill: Bring trenches to grade indicated on the drawings using material excavated on the site of this project. This material shall be approved by the Geotechnical Engineer prior to use as backfill. The maximum size of material used for backfill shall not exceed 2 inches.
- B. Bedding: Sand, gravel or crushed aggregate as indicated in the referenced Standard Drawing for the specific utility.

2.2 BURIED WARNING AND IDENTIFICATION TAPE

Polyethylene plastic and metallic core or metallic-faced, acid- and alkali-resistant, Polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3" minimum width, color coded as stated below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing is to be permanent, unaffected by moisture or soil.

Warning Tape Color Codes

Blue: Water Lines, including Fire, Domestic and Irrigation

Green: Sewer Lines

White: Storm Drain Lines

- A. Warning Tape for Metallic Piping: Acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements indicated above. Minimum thickness of the tape shall be 0.003". Tape shall have a minimum strength of 1500 psi lengthwise and 1250 psi crosswise with a maximum 350% elongation.
- B. Detectable Warning Tape for Non-Metallic Piping: Polyethylene plastic tape conforming to the width, color, and printing requirements indicated above. Minimum thickness of the tape shall be 0.004". Tape shall have a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. The tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a Metal detector when the tape is buried up to 3' deep. Encase the metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

PART 3 EXECUTION

3.1 GENERAL EXCAVATION

- A. Keep excavations free from water while construction is in progress. Make trench sides as nearly vertical as practicable except where sloping of sides is allowed or required. Sides of trenches shall not be sloped from the bottom of the trench up to the elevation of the top of the utility. Excavate ledge rock boulders and other unyielding material to an overdepth at least 1 foot below the bottom of the utility unless otherwise indicated or specified on the drawings. Use sand placed in 6-inch maximum layers to refill overdepths to the

proper grade. Grade bottom of trenches accurately to provide uniform bearing and support for each section of utility on undisturbed soil, or bedding material as indicated or specified at every point along its entire length except for portions where it is necessary to excavate for bell holes and for making proper joints. Dig bell holes and depressions for joints after trench has been graded.

- B. Dimensions of bell holes shall be as required for properly making the particular type of joint to ensure that the bell does not bear on the bottom of the excavations. Trench dimensions shall be as indicated or specified.

3.2 GENERAL BEDDING

- A. Shall be of the materials and depths as indicated for the utility and utility structures. Place bedding in 6-inch maximum loose lifts to 1 foot above utility unless otherwise specified. Ensure that initially placed material is tamped firmly under pipe haunches. Bring up evenly on each side and along the full length of the structure. Ensure that no damage is done to structures or their protective coatings. Provide uniform and continuous support for each section of structure except at bell holes or depressions necessary for making proper joints.

3.3 BURIED WARNING AND IDENTIFICATION TAPE

- A. Install tape in accordance with manufacturer's recommendations except as modified herein. Bury tape 6 inches below finished grade; under pavements bury tape 6 inches below top of subgrade.

3.4 GENERAL BACKFILLING

- A. Place backfill on top of bedding material in 8-inch maximum loose lifts unless otherwise specified. Compact each loose lift as specified in paragraph "General Compaction" before placing the next lift. Do not backfill where the material in the trench is muddy, except as authorized. Where settlements greater than the tolerance allowed herein for grading occur in trenches and pits due to improper compaction, excavate to the depth necessary to rectify the problem, then backfill and compact, the excavation as specified herein and restore the surface to the required elevation. Coordinate backfilling with testing of utilities: Complete all testing for utilities before backfilling.

3.5 GENERAL COMPACTION

- A. Use hand-operated, plate-type, vibratory, or other suitable hand tampers in areas not accessible to larger rollers or compactors. Avoid damaging pipes and protective pipe coatings. Compact material in accordance with the following unless otherwise specified. If necessary, alter, change, or modify selected equipment or compaction methods to meet specified compaction requirements.
- B. Compaction of Bedding and Backfill: Compact bedding and backfill material surrounding pipes to 90% of ASTM D1557 maximum density. Compact top 12-inches of bedding and backfill material to 95% under asphalt and concrete pavements.

3.6 SPECIAL EARTHWORK INSTALLATION REQUIREMENTS

- A. Precast Meter Boxes, Catch Basins and Cast-in-Place Structures: Provide at least 12 inches clear from outer surfaces to the embankment or shoring. Remove rock as specified herein. Remove unstable soils that are incapable of supporting the structure to an overdepth of 1 foot and refill with gravel or sand to the proper elevation. Refill

overdepths with gravel or sand to the required grade and compact as specified. Set precast concrete structures on a minimum of 6 inches of gravel or sand material.

- B. Grading: Finish to grades indicated within 0.10 foot. Grade areas to drain water away from structures. Grade existing grades that are to remain but have been disturbed by the Contractor's operations.
- C. Protection of Surfaces: Protect newly graded areas from traffic, erosion, and settlements that may occur due to construction activity. Repair or reestablish damaged grades, elevations, or slopes.
- D. Pavement Repair: Repair pavement, curbs, and gutters damaged during construction with new improvements. Do not repair pavement until trench or pit has been backfilled and compacted as herein specified. Provide a temporary road surface of gravel or crushed stone over the backfilled portion until permanent pavement is repaired. Remove and dispose of temporary road surface material when permanent pavement is placed.

3.7 SOIL TESTING

- A. Soil testing during pipeline construction shall be performed by a Geotechnical Testing Laboratory. Reference Div 1, "Testing" for specific requirements. Materials and operations under this Section shall be monitored by qualified Geotechnical Laboratory personnel under the direction of a Geotechnical Engineer. In general, one field density test shall be made per lift for every 50 feet of trench backfill, unless directed otherwise by the Geotechnical Engineer.
- B. The Geotechnical Engineer shall make random field density tests of the compacted backfill to provide a basis for expressing an opinion as to whether the backfill material is compacted as specified. The basis for this opinion shall be that no tests in compacted or recompacted backfill areas indicate a relative compaction of less than that specified. Density tests shall be made in the compacted materials below any disturbed surface. When these tests indicate that the density of any lift or portion thereof is below that specified, the particular layer or areas represented by the test shall be reworked until the specified density has been achieved.
- C. The Contractor shall be responsible for any rework necessary to achieve the specified densities to the satisfaction of the Geotechnical Engineer.

END OF SECTION

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SECTION 31 31 16
TERMITE CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Chemical soil treatment.
- B. Wood treatment.
- C. Metal mesh barrier system.

1.2 RELATED REQUIREMENTS

- A. Section 061000 "Rough Carpentry" for wood preservative treatment by pressure process.
- B. Section 076200 "Sheet Metal Flashing and Trim" for custom-fabricated, metal termite shields.

1.3 REFERENCE STANDARDS

- A. Title 7, United States Code, 136 through 136y - Federal Insecticide, Fungicide and Rodenticide Act; United States Code; 1947 (Revised 2001).

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate toxicants to be used, composition by percentage, dilution schedule, intended application rate.
- C. Test Reports: Indicate regulatory agency approval reports when required.
- D. Manufacturer's Application Instructions: Indicate caution requirements .
- E. Manufacturer's Certificate: Certify that toxicants meet or exceed specified requirements.
- F. Certificate of compliance from authority having jurisdiction indicating approval of toxicants.
- G. Record moisture content of soil before application, date and rate of application, and areas of application.
- H. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's records and include the following:
 - 1. Date and time of application.
 - 2. Moisture content of soil before application.
 - 3. Termiticide brand name and manufacturer.
 - 4. Quantity of undiluted termiticide used.
 - 5. Dilutions, methods, volumes used, and rates of application.
 - 6. Areas of application.
 - 7. Water source for application.
- I. Maintenance Data: Indicate re-treatment schedule .
- J. Warranty: Submit warranty and ensure that forms have been completed in Owner's name.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing this type of work and:

1. Having minimum of 2 years documented experience.
2. Approved by manufacturer of treatment materials.
3. Licensed in the State in which the Project is located.

1.7 FIELD CONDITIONS

A. Soil Treatment:

1. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.
2. Related Work: Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

1.8 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year installer's warranty against damage to building caused by termites.
 1. Include coverage for repairs to building and to contents damaged due to building damage. Repair damage and, if required, re-treat.
 2. Inspect annually and report in writing to Owner. Provide inspection service for two years from Date of Substantial Completion.
- C. Soil Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work consisting of applied soil termiticide treatment will prevent infestation of subterranean termites, including Formosan termites (*Coptotermes formosanus*). If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
 1. Warranty Period: Five years from date of Substantial Completion.
- D. Wood Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work consisting of applied wood termiticide treatment will prevent infestation of subterranean termites, including Formosan termites (*Coptotermes formosanus*). If subterranean termite damage is discovered during warranty period, repair or replace damage caused by termite infestation and treat replacement wood.
 1. Warranty Period: 12 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 SOIL TREATMENT

- A. Termiticide: EPA-Registered termiticide acceptable to authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Corporation; Phantom.
 - b. Bayer Environmental Science; Premise 2.
 - c. Ensystem, Inc; Maxxthor SC.
 - d. Syngenta; Demon Max.
 2. Service Life of Treatment: Soil treatment termiticide that is effective for not less than five years against infestation of subterranean termites.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that soil surfaces are unfrozen, sufficiently dry to absorb toxicant, and ready to receive treatment.
- B. Verify final grading is complete.

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Fire Station No. 22
Termite Control

- C. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil per termiticide label, interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control.
- D. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Prepare work areas according to the requirements of authorities having jurisdiction and according to manufacturer's written instructions before beginning application and installation of termite control treatment(s). Remove extraneous sources of wood cellulose and other edible materials, such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.
- B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.
 - 1. Fit filling hose connected to water source at the site with a backflow preventer, according to requirements of authorities having jurisdiction.

3.3 APPLICATION OF SOIL TREATMENT

- A. Comply with requirements of U.S. EPA and applicable state and local codes.
- B. Spray apply toxicant in accordance with manufacturer's instructions.
- C. Apply toxicant at following locations:
 - 1. Under Slabs-on-Grade.
 - 2. Soil Within 10 feet (3 m) of Building Perimeter For a Depth of 3 feet (1 m).
- D. Under slabs, apply toxicant immediately prior to installation of vapor barrier.
- E. Apply extra treatment to structure penetration surfaces such as pipe or ducts, and soil penetrations such as grounding rods or posts.
- F. Re-treat disturbed treated soil with same toxicant as original treatment.
- G. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

3.4 PROTECTION

- A. Do not permit soil grading over treated work.
- B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
- C. Protect termiticide solution dispersed in treated soils and fills from being diluted by exposure to water spillage or weather until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

3.5 MAINTENANCE SERVICE

- A. Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of termite-control-treatment Installer. Include semiannual maintenance as required for proper performance according to the product's EPA-Registered Label and manufacturer's written instructions. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
- B. Continuing Maintenance Proposal: Provide from termite-control-treatment Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial

maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1. Include annual inspection for termite activity and effectiveness of termite treatment according to manufacturer's written instructions.

END OF SECTION

SECTION 32 11 70

PAVERS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Provide and install base as per Civil Engineer details on Drawings, to provide adequate support for project designs loads.
 - 2. Provide permeable pavers and installation per the manufacturer's instructions.
- B. Related Work:
 - 1. Subgrade preparation under Section 31 20 00 Earthwork.
 - 2. Utilities and subsurface drainage - Section 32 72 00 - Storm Drain System.

1.2 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions.
- B. Submit material certificates for base course and sand fill materials.
- B. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.3 QUALITY ASSURANCE

- A. Installation: Performed only by skilled work people with satisfactory record of performance on landscaping or paving projects of comparable size and quality.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect permeable pavers units from damage during delivery and store under tarp when time from delivery to installation exceeds one week.

1.6 SITE/PROJECT CONDITIONS

- A. Review installation procedures and coordinate permeable paver work with other work affected.
- B. All hard surface paving adjacent to permeable paver areas, including concrete walks and asphalt paving, must be completed prior to installation of pavers.
- C. Cold weather:
 - 1. Do not use frozen materials or materials mixed or coated with ice or frost.
 - 2. Do not build on frozen work or wet, saturated or muddy subgrade.

- D. Protect partially completed paving against damage from other construction traffic when work is in progress.
- E. Protect adjacent work from damage during permeable paver installation.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
- B. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
- C. Manufacturer (permeable pavers): orco paving stones www.orcopaverswalls.com or equal.
- D. Base Course: As detailed on Drawings C-2.
- E. Permeable interlocking concrete pavements (PICPs) are available in many different shapes and sizes. When lain, the blocks form patterns that create openings through which rainfall can infiltrate. The openings, generally 8 to 20 percent of the surface area, are typically filled with pea gravel aggregate but can also contain top soil and grass. ASTM C936 specifications (200 1b) state that the pavers be at least 2.36 inches (60 mm) thick with a compressive strength of 55 MPa (8,000 psi) or greater. Typical installations consist of the pavers and gravel fill, a 1.5- to 3.0 -inch (38 to 76 mm) fine-gravel bedding layer, and a gravel base-course, typically a washed no. 57, storage layer (ICPI 2004). Minimum joint spacing 1/8".
- F. Color/Finish: to be chosen by Architect.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine subgrade and base course installed conditions. Do not start pervious paver installation until unsatisfactory conditions are corrected. Check for poor drainage, improperly compacted trenches, debris, and improper gradients.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance. If existing conditions are found unsatisfactory, contact Resident Engineer for resolution.

3.2 INSTALLATION OF PERMEABLE PAVERS

- A. Install the permeable pavers units in accordance with manufacturer's printed instruction and units.

3.3 CLEANING

- A. Remove and replace segments of pervious paver units where pavers are broken or damaged, reinstalling as specified, with no evidence of replacement.
- B. Perform cleaning during the installation of work and upon completion of the work. Remove all excess materials, debris, and equipment from site. Repair any damage to adjacent materials and surfaces resulting from installation of this work.
- C. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

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SECTION 32 17 13
PARKING BUMPERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Precast concrete parking bumpers and anchorage.

1.2 REFERENCE STANDARDS

- A. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2015.
- B. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.
- C. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.
- D. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete; 2014.

1.3 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide unit configuration, dimensions.

1.4 SUSTAINABILITY SUBMITTALS

- A. LEED Submittals: Provide special submittals conforming to Section 018113 – Sustainable Design Requirements for the following:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and pre consumer recycled content. Include statement indicating cost for each product having recycled content.
 - 2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
 - a. Include statement indicating location of manufacturer and point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials. Indicate distance to Project and fraction by weight of each regionally manufactured material that is regionally extracted.
 - 3. LEED Credit EQc4.1: Provide adhesive VOC Emissions Data for the specified materials. Provide the product manufacturer's most current VOC emissions data.
 - 4. Laboratory Test Reports for Credit IEQ 4.1: For adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - 5. LEED Credit EQc4.2: Provide paint VOC Emissions Data for the specified materials. Provide the product manufacturer's most current VOC emissions data.
- B. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 2 years experience in production of parking bumpers specified.

- B. Certifications: Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Parking Bumpers: Precast concrete, conforming to the following:
 1. Nominal Size: 4-1/2 inches (114.3 mm) high, 9 inches (228.6 mm) wide, 6 feet (2 m m) long.
 2. Profile: Manufacturer's standard.
 3. Cement: ASTM C150, Portland Type I - Normal; white color.
 4. Concrete Materials: ASTM C330/C330M aggregate, water, and sand.
 5. Reinforcing Steel: ASTM A615/A615M, deformed steel bars; unfinished, strength and size commensurate with precast unit design.
 6. Air Entrainment Admixture: ASTM C260/C260M.
 7. Concrete Mix: Minimum 5,000 psi (34 MPa) compressive strength after 28 days, air entrained to 5 to 7 percent.
 8. Use rigid molds, constructed to maintain precast units uniform in shape, size and finish. Maintain consistent quality during manufacture.
 9. Embed reinforcing steel, and drill or sleeve for two dowels.
 10. Provide chamfered corners, transverse drainage slots on underside.
 11. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.
 12. Minor patching in plant is acceptable, providing appearance of units is not impaired.
- B. Dowels: Steel, unfinished; 1/2 inch (12 mm) diameter, 10 inch (254 mm) long, pointed tip.
- C. Adhesive: Epoxy type.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install units without damage to shape or finish. Replace or repair damaged units.
- B. Install units in alignment with adjacent work.
- C. Fasten units in place with spot adhesive.

END OF SECTION

SECTION 32 17 26
TACTILE WARNING SURFACING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Plastic tactile and detectable warning tiles for pedestrian walking surfaces.

1.2 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Concrete for sidewalks and platforms.
- B. Section 321723.13 - Painted Pavement Markings: Crosswalk and curb markings.

1.3 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. 49 CFR 27, 37, and 38 - Standards for Accessible Transportation Facilities, Final Rule; Department of Transportation; current edition.
- C. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- E. ATBCB PROWAG - Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way; 2011.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturer's product data, standard details, details specific to this project; written installation and maintenance instructions.
- C. Samples: For each product specified provide two samples, 8 inches (203 mm) square, minimum; show actual product, color, and patterns.
- D. Shop Drawings: Submit plan and detail drawings. Indicate:
 - 1. Locations on project site. Demonstrate compliance with referenced accessibility standards.
 - 2. Sizes and layout.
 - 3. Pattern spacing and orientation.
 - 4. Attachment and fastener details, if applicable
- E. Warranty: Submit manufacturer warranty; complete forms in Owner's name and register with manufacturer.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than two years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver to project site in manufacturer's protective wrapping and in manufacturer's unopened packaging.
- B. Store covered and elevated above grade and in manufacturer's unopened packaging until ready for installation. Maintain at ambient temperature between 40 and 90 degrees F (4 and 32 degrees C).

1.7 PROJECT CONDITIONS

- A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.
- B. Weather Limitations for Adhesive Application:
 - 1. Apply adhesive only when ambient temperature is above 50 deg F and when temperature has not been below 35 deg F for 12 hours immediately before application. Do not apply when substrate is wet or contains excess moisture.

1.8 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Plastic Tiles: Provide manufacturer's standard five year warranty against manufacturing defects, breakage or deformation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Cast-in-Place Detectable Warning Tiles: Accessible truncated-dome detectable warning tiles with replaceable surface configured for setting flush in new concrete walkway surfaces, with slip-resistant surface treatment on domes and field of tile.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide ADA Solutions, Inc.; Cast In Place Replaceable Detectable Warning Surface Tiles or a comparable product by one of the following:
 - a. Advanced Surface Systems, LLC.
 - b. AlertTile; a division of Cape Fear Systems, II, LLC.
 - c. Detectable Warning Systems, Inc.
 - d. Detectile Corp.
 - e. StrongGo Industries, LLC.
 - f. Transpo Industries, Inc.
- B. Material: Molded glass- and carbon-fiber-reinforced polyester.
- C. Color: As selected by Architect from manufacturer's full line.
- D. Shapes and Sizes:
 - 1. Rectangular panel, as required to provide minimum joints.
 - 2. Radius panel, nominal 24 inches deep by outside radius.
- E. Dome Spacing and Configuration: Manufacturer's standard compliant spacing, in pattern.
- F. Mounting:
 - 1. Replaceable detectable warning tile wet-set into freshly poured concrete and surface-fastened to permanently embedded anchors.

2.2 ACCESSORIES

- A. Fasteners: ASTM A666, Type 304 stainless steel
 - 1. Type: Countersunk, color matched composite sleeve anchors
 - 2. Size: 1/4 inch (6.35 mm) diameter and 1-1/2 inches (38 mm) long.
- B. Adhesive: Type recommended and approved by surfacing tile manufacturer.
 - 1. Adhesives shall meet VOC and chemical component limits of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 and Cal GREEN Table 5.504.4.1 Adhesive VOC Limit requirements.

- C. Sealant: Elastomeric sealant of color to match adjacent surfaces; approved by surfacing tile manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. When installation location is near site boundary or property line, verify required location using property survey.
- B. Verify that work area is ready to receive work:
 - 1. Examine work area with installer present.
 - 2. If existing conditions are not as required to properly complete the work of this section, notify Architect.
 - 3. Do not proceed with installation until deficiencies in existing conditions have been corrected.
- C. Verify that dimensions, tolerances, and attachment methods for work in this section are properly coordinated with other work on site.

3.2 INSTALLATION, GENERAL

- A. Install in accordance with manufacturer's written instructions.
 - 1. Do not install damaged, warped, bowed, dented, abraded, or otherwise defective units.
 - 2. Do not install when ambient or substrate temperature has been below 40 degrees F (4 degrees C) during the preceding 8 daylight hours.
- B. Field Adjustment:
 - 1. Cut units to size and configuration shown on drawings.
 - 2. Locate relative to curb line in compliance with PROWAG, Sections 304 and 305.
 - 3. Orient so dome pattern is aligned with the direction of ramp.
 - 4. Align truncated dome pattern between adjacent units.
- C. Install units fully seated to substrate, square to straight edges and flat to required slope.
- D. Align units so that tops of adjacent units are flush and joints between units are uniform in width.

3.3 INSTALLATION, CAST IN PLACE PLASTIC TILES

- A. When installing multiple adjacent units, leave a 3/16 inch (5 mm) gap between units to allow for expansion.
- B. Tamp and vibrate units as recommended by manufacturer.
- C. Place and position weights on units while concrete cures as recommended by manufacturer. Ensure no voids or air pockets exist between top surface of concrete and underside of units.

3.4 CLEANING PLASTIC UNITS

- A. Remove protective plastic sheeting within 24 hours of installation.
- B. Remove excess sealant or adhesive from joints and edges.
- C. Clean four days prior to date of scheduled inspection.
- D. Clean 4 days prior to date of scheduled inspection.

3.5 PROTECTION

- A. Protect installed units from traffic, subsequent construction operations or other imposed loads until concrete is fully cured.

B. Touch-up, repair or replace damaged products prior to Date of Substantial Completion.

END OF SECTION

SECTION 32 23 30

GRADED CRUSHED AGGREGATE BASE COURSE FOR PAVEMENTS

PART 1 GENERAL

1.1 SUMMARY

The work includes placement of aggregate base course for pavements and structures as indicated. Class 2 Material, meeting Caltrans requirements, may be used in lieu of crushed aggregate base as specified.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A. Standard Specifications:

1. Standard Specifications for Public Works Construction (2012 Edition), "Greenbook", including the latest edition of the City of San Diego Regional Standard Specifications for Public Works Construction (Whitebook) 2012 Edition.
2. California Department of Transportation U.S. Customary Standard Specifications, 2010 Edition.

B. Standard Drawings:

1. City of San Diego Standard Drawings for Public Works Construction, 2012 Edition.
2. California Department of Transportation U.S. Customary Standard Specifications, 2010 Edition.

C. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C136	(1993) Sieve Analysis of Fine and Course Aggregates
ASTM D1556	(1990) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	(1991) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft (2,700 kN -m/m))
ASTM D2172	(1993) Quantitative Extraction of Bitumen from Bituminous Paving Mixtures

1.4 QUALITY ASSURANCE

Materials and workmanship specified herein with the referenced Greenbook Standard Specifications and California Department of Transportation U.S. Customary Standard Specifications, 2010 Edition shall be in accordance with the referenced articles, sections and paragraphs of the standard except that contractual and payment provisions do not apply.

1.5 SITE INSPECTION AND LOCATION OF EXISTING ON-SITE UTILITIES:

Prior to all work of this Section, carefully inspect the entire site and all existing items to be demolished and removed or to be left intact and determine an orderly sequence for the performance of this work. Exact locations and alignment of existing buried utility lines are not known. Locate all existing utility lines and determine the requirements for disconnection and capping. Locate all active utilities traversing the area of work to be retained and determine the requirements for protection. Locate all points of connection and crossings by potholes and determine exact horizontal and vertical location prior to commencing the work.

1.6 PROTECTION

- A. Protection and Restoration of Surface: Protect newly graded areas from traffic, erosion, and settlements. Repair and reestablish damaged or eroded slopes, elevations or grades and restore surface construction prior to acceptance. Provide erosion control to prevent water-borne soil from leaving the work area by means of straw bale dikes or sand bags. The Contractor shall be responsible to clean up any soil deposited in the public right-of-way or on adjacent property. The Contractor shall be responsible to protect storm drain catch basins with sand bags and to prevent sediment from entering the storm drain system during construction.

1.7 RELATED WORK IN OTHER SECTIONS

The following work specified in other sections applies to the work of this Section, including but not limited to:

- A. Div 1 as if fully repeated here in.
- B. Div 31

1.8 SAFETY DURING CONSTRUCTION

The Contractor shall assume sole and complete responsibility for job site conditions during the course of construction of the project, including safety of all persons and property. This requirement shall be made to apply continuously and not be limited to normal working hours. Refer to Part Three of this Section and Division 1 for additional requirements.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Crushed Aggregates Base Course
 - 1. Base Course Materials shall comply with Section 200-2.2 of the Greenbook Specifications for 3/4" maximum aggregate.

PART 3 EXECUTION

3.1 PREPARATION

Subgrade: Requirements for subgrade are specified in Section 31 20 00, "Earthwork for Structures and Pavements". Prior to construction of base course, clean previously constructed subgrade of foreign substances.

3.2 INSTALLATION

A. Aggregate Base Course Installation: Place aggregate base in accordance with requirements of Section 301-2 of the Greenbook Specifications. Grade and compact in layers to at least 95% of maximum density (ASTM D-1557). Maintain base course in proper condition until Portland cement concrete is in place, including drainage, rolling, shaping, and watering. Maintain sufficient moisture at the surface to prevent a dusty condition by light sprinkling with water. Recondition, reshape, and recompact areas of completed base course damaged in accordance with the specified requirements.

B. Aggregate Base Course thickness shall be as indicated.

3.3 FIELD QUALITY CONTROL

Soil testing during construction shall be performed by a Geotechnical Testing Laboratory as specified in Div 1, "Testing ". Contractor shall coordinate with Resident Engineer's testing laboratory.

All material testing shall be performed by the Geotechnical Engineer. The following tests shall be performed:

A. Base Course Finish Surface: Surface tolerance shall conform to Section 301-2.3 of the Greenbook Specifications. When base course is constructed in more than one layer, specified smoothness requirements apply only to top surface.

B. Gradation: Perform base course gradation test in accordance with ASTM C136. Make one test for each 100 tons of material.

C. Base Course Density: Perform in place density tests in accordance with ASTM D1557. Make one maximum density test for each gradation. Make one set of two tests each for in place density for each 200 square yards of surface area. In place density of aggregate base course shall be at least 95% of the laboratory maximum density.

END OF SECTION

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SECTION 32 31 19

ORNAMENTAL FENCES AND GATES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wrought Iron Fencing.
 - 2. Wrought iron swing gates, both electrically operated and manually operated with latches as indicated on Drawings.
 - 3. Wrought iron electrically operated rolling gate.
- B. Related Sections:
 - 1. Section 32 31 40 - Gate Operators

1.2 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings showing layouts, dimensions, construction details and installation, including fastening devices.
- B. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

PART 2 PRODUCTS

2.1 MATERIALS

- A. General
 - 1. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
 - 2. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.
- B. Steel: Commercial quality steel conforming to ASTM A36, hot-rolled sections for bars, angles, channels and other miscellaneous steel. Basic shapes shall be cold-rolled and electrically welded.
- C. Steel Pipe: ASTM A53.
- D. Tube: ASTM A500, Grade B.
- E. Gray Iron Castings: ASTM A48, Class 30.
- F. Malleable Iron Castings: ASTM A47, Grade 32510.
- G. Anchor and Expansion Bolts: ASTM A307 anchor bolts, unless otherwise noted. Expansion bolts to have I.C.B.O. rating for material into which the installation takes place. Furnish anchor and expansion bolts with steel washers.

H. Paint: Powder coat paint with TGIC Polyester Coating. Paint colors per plans.

2.2 FABRICATION

A. Construction shall be shop welded by Arc-gas shield weld for smooth, clean, slag-free welds. Grind welds smooth. Completely prime and paint. Posts, pickets and rails sizes and shapes shall be as shown on the Drawings.

B. Gates:

1. Prepare gates as shown or required for hardware provided by others.
3. Hinges: Non-lift off type, offset to allow 180 degree gateopening.
4. Provide and install roller guides, tracks, rails, guides, support angles, etc., as required for smooth operation of rolling and sliding gates.
5. At sliding gates, include a 1-1/2 inch x 1-1/2 inch x 3/16 inch guide angle cast into a 1'-0" wide x 1'-6" thick concrete pad running the full length of the wheel travel.
6. Wheels: 4" dia x 3" wide Delrin 'V' groove roller, ball bearing..

C. Insulate contact joints between dissimilar materials to prevent electrolytic or corrosive action.

2.3 SHOP PAINTING

A. Thoroughly clean iron and metal to be primed of scale, dirt and dust by steel scraper, wire brushes or sandblasting.

B. All components shall be powder coated after complete fabrication with triglycidyl isocyanurate (TGIC) powder, a polyester coating. To insure powder coat adhesion, steel must be free of any scale, paint, varnish, or rust. Substrate preparation prior to powder coating is to include a chemical wash and rinse followed with an iron phosphate treatment. Finished product shall appear bright and smooth, with a refined appearance.

PART 3 EXECUTION

3.1 INSTALLATION

A. Anchor posts in concrete footings or attach to masonry walls as shown on the Drawings.

B. Securely anchor gates and erect plumb, level, and true, with smooth operating hardware.

C. Touch up abrasions, bolts, rivets, welds and other spots after erection with the same type of paint as used for shop coat.

3.2 CLEANING

A. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of away from premises. Leave Work in clean condition.

B. Construction Waste: In accordance with Section 01 74 19.

END OF SECTION

SECTION 32 31 40

GATE OPERATOR

PART 1 GENERAL

1.1 SUMMARY

- A. Related Sections:
 - 1. Section 32 31 19 - Ornamental Fences and Gates
 - 2. Division 26 - Electrical

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications, design data and installation instructions.
- B. Shop Drawings: Submit drawings showing layout, dimensions and construction details, including wiring diagram.
- C. Contract Closeout Submittals: Submit Manual for care and operation in accordance with Section 01 77 00.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in manufacturer's original unopened packaging with labels intact. Protect finished surfaces with removable wrapping or coating which will not bond when exposed to sunlight.
- B. Storage: Adequately protect against damage while stored at the site.
- C. Handling: Comply with manufacturer's instructions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Furnish products of one of the following manufacturers, except as approved by the Architect and Resident Engineer, subject to compliance with specifications requirements:
 - 1. Elite (www.gateoperator.com) (Basis of Design)
 - 2. Stanley Automatic Operators, Div. of The Stanley Works (www.mhfence.com)
 - 3. Edko (www.edko.com)
 - 4. Crown Industrial (www.crown-industrial.com)
 - 5. GTO (www.gtoinc.com)
 - 6. Or equal.
- B. Specifications are based on products as manufactured by Elite.

2.2 SWING GATE OPERATOR

- A. Operator: Model SW 2000-UL-1 (one horsepower) as manufactured by Elite or equal as manufactured by one of the manufacturers specified above, designed to function with the gate size and weight required for this project.
 - 1. Provide key pad access for opening function as per operation specified herein.
 - 2. Provide actuator loop under pavement for closing function
 - a. Self-tuning sensor system for magnetically reading presence of approaching vehicle.
 - b. Provide in weatherproof enclosure for exterior mounting.
 - c. Provide loop detectors and all required PVC conduit.
 - d. Provide push button keypad (location as directed by Architect and Resident Engineer)
 - e. Remote wireless capability (RINEAR DELTA 3) receiver.
 - f. Provide timer (self close capability via delay timer).

2.3 SWING GATE OPERATOR EQUIPMENT

- A. Operator: Model SL3000UL1HP as manufactured by Elite or equal as manufactured by one of the manufacturers specified above, designed to function with the gate size and weight required for this project.
 - 1. Provide key pad access for opening function as per operation specified herein.
 - 2. Provide actuator loop under pavement for closing function
 - a. Self-tuning sensor system for magnetically reading presence of approaching vehicle.
 - b. Provide in weatherproof enclosure for exterior mounting.
 - c. Provide loop detectors and all required PVC conduit.
 - d. Provide push button keypad (location as directed by Architect and Resident Engineer)
 - e. Remote wireless capability (RINEAR DELTA 3) receiver.
 - f. Provide timer (self close capability via delay timer).

2.4 OPERATIONAL CONTROLS

- A. Gates shall be electrically operated with key pad, Knox Box key, and remote switch capability in station and using Delta III controller-receiver.
- B. Self contained keypad system: MINIkey from Chamberlain
- C. Knox Key Switch: Single FD Switch, Model 3502
- D. Timer – Grässlin GMXdigi-20 Series (includes exterior weatherproof housing)
- E. Magnetic Vehicle Detector
 - 1. Self-tuning sensor system for magnetically reading presence of approaching vehicle.
 - 2. Provide in weatherproof enclosure for exterior mounting.
 - 3. Provide loop detectors and all required PVC conduit.
 - 4. Detector shall keep gate open while vehicle is located within gate location and shall override the time delay device.

PART 3 EXECUTION

3.1 EXAMINATION

- A. **Verification of Conditions:** Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect and Resident Engineer. Commencement of Work will be construed as acceptance of subsurfaces.
- B. **Coordination:** Coordinate with other work which affects, connects with, or will be concealed by this Work.

3.2 INSTALLATION

- A. **Gate operators and controllers:** Install units at locations indicated in accordance with manufacturer's written instructions and approved Shop Drawings.
 - 1. Provide controller equipped with Fire Department Override Access.
 - 2. Test and adjust operators and controllers for smooth, trouble-free operation.
- B. Adjust gate limit switch, clutch and brake, and test for proper operation.

3.3 CLEANING

- A. During the course of the Work and on completion of the Work, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- B. **Construction Waste:** In accordance with Section 01 74 19

END OF SECTION

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SECTION 32 35 00
SITE SCREENING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pre-formed thermoplastic panel for screening or buffering trash enclosures.
 - 2. Aluminum support framing for direct attachment of screen support columns are provided for attachment to paving, piers, or footings provided by others.
 - 3. Operable gates for access through screens.
- B. Products Not Installed or Furnished in This Section:
 - 1. Touch-up painting required for scratches and screw heads.
 - 2. Field painting of prime painted screens

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Products: Covrit Gates and Screening System by CityScapes International Inc, 4200 Lyman Ct. Hilliard, OH 43026. 1-877-727-3367 www.cityscapesinc.com www.covrit.com.
- B. Substitutions: Submit in accordance with Section 01 25 00 [01600].

2.2 MATERIALS

- A. Plankwall™, PVC (Polyvinyl Chloride), AcrylicCap™ ABS (Acrylic Butylene Styrene), Metal Series (Coated steel sheets with foam core), Classic Brick (Polyurethane) Ipe Brazilian Hardwood (100% IPE Brazilian Hardwood) , Gates are comprised of natural wood, or PVC (Polyvinyl Chloride) sheets.
 - 1. Minimum thickness: 3/16 inch (4.7625mm).
- B. Framing: Aluminum Plate, Shapes and Bar: ASTM B 221, alloy 6005-T5, 6061-T5 or 6063-T5.
- C. Threaded Fasteners: All screws, bolts, nut and washers shall be Stainless steel.
 - 1. Corner assembly fasteners shall be #10-16 x stainless steel TEK screws.
 - 2. Provide lock washer or other locking device at all bolted connections.

2.3 FABRICATION

- A. Provide factory-formed panel systems with continuous interlocking panel connections and indicated or necessary components: Form all components true to shape, accurate in size, square and free from distortion or defects. Cut panels to precise lengths indicated on approved shop drawings.
- B. Fabricate products to the following configurations:
 - 1. Panel Style: Plankwall Vertical Plankwall Horizontal
 - 2. Gate Style:
 - a. Park Collection: Madison Mission
 - 3. Panel and Gate Height: 6 custom feet.
 - 4. Gate Width: [40] [63] [75] [custom] inches.
 - 5. Decorative Top Rail Trim Profile: Boxed.
 - 6. Column Cap Style: Standard Hip.
 - 7. Dumpster Layout: Series custom.

- C. Trim and Closures: Fabricated and finished with the manufacturers standard coating system, unless shown otherwise on drawings.
 - D. Framing: Fabricate and assemble components in largest practical sizes, for delivery to the site.
 - 1. Construct corner assemblies to required shape with joints tightly fitted.
 - 2. Supply components required for anchorage of framing. Fabricate anchors and related components of material and finish as required, or as specifically noted.
 - E. Gate Hardware: Provide manufacturer's standard adjustable [cradle pipe hinge] [hold open pipe hinge] [barrel hinge] of size required to fit support pipe provided.
- 2.4 FINISHES
- A. Aluminum Framing: Mill finish.
 - B. Panel Coating: Manufacturer's standard coating system, factory-applied.
 - 1. Color: Custom color as selected by Architect to match existing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Installer's Examination: Examine conditions under which construction activities of this section are to be performed.
 - 1. Submit written notification to Architect and Screen manufacturer if such conditions are unacceptable.
 - 2. Beginning erection constitutes installer's acceptance of conditions.

3.2 INSTALLATION

- A. Install units in accordance with the manufacturer's instructions and approved shop drawings. Keep perimeter lines straight, plumb, and level. Provide brackets, anchors, and accessories necessary for a complete installation.
- B. Fasten structural supports to paving, footings, or piers at spacing as indicated on approved shop drawings.
- C. Insert thermoplastic panels into structural supports, except where fixed attachment points are indicated. Butt thermoplastic panels to adjacent panels for uniform fit. Fasten fixed panels in accordance with the shop drawings.
- D. Metal Separation: Where aluminum materials would contact dissimilar materials, insert rubber grommets at attachment points, thus eliminating where dissimilar metals would otherwise be in contact.
- E. Do not cut or abrade finishes which cannot be restored. Return items with such finishes to shop for required alterations.

3.3 ERECTION TOLERANCES

- A. Maximum misalignment from true position: ¼ inch (6.35 mm).

3.4 CLEANING AND PROTECTION

- A. Remove all protective masking from material immediately after installation.

- B. Protection:
 - 1. Ensure that finishes and structure of installed systems are not damaged by subsequent construction activities.
 - 2. If minor damage to finishes occurs, repair damage in accordance with manufacturer's recommendations; provide replacement components if repaired finishes are unacceptable to Architect.
- C. Prior to Substantial Completion: Remove dust or other foreign matter from component surfaces; clean finishes in accordance with manufacturer's instructions.
 - 1. Clean units in accordance with the manufacturer's instructions.

END OF SECTION

September 25, 2015

32 35 00 - 3

Fire Station No. 22
Site Screening Devices

SECTION 32 51 40

PORTLAND CEMENT SITE CONCRETE PAVING

PART 1 GENERAL

1.1 SUMMARY

- A. The work includes the construction of the PCC pavements, jointing, finishing and steel reinforcements, as indicated on the Drawings and specified herein. All public improvements shall be constructed in accordance with the indicated Standard Drawings.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A. Standard Specifications:

1. Standard Specifications for Public Works Construction (2012 Edition), "Greenbook", including the latest edition of the City of San Diego Regional Standard Specifications for Public Works Construction (Whitebook) 2012 Edition.
2. California Department of Transportation U.S. Customary Standard Specifications, 2010 Edition.

B. Standard Drawings:

1. City of San Diego Standard Drawings for Public Works Construction, 2012 Edition.
2. California Department of Transportation U.S. Customary Standard Specifications, 2010 Edition.

1.3 QUALITY ASSURANCE

- A. Materials and workmanship specified herein with the referenced Standard Specifications shall be in accordance with the referenced articles, sections and paragraphs of the standard except that contractual and payment provisions do not apply.

1.4 SITE INSPECTION AND LOCATION OF EXISTING ON-SITE UTILITIES:

- A. Prior to all work of this Section, carefully inspect the entire site and all existing items to be demolished and removed or to be left intact, and determine an orderly sequence for the performance of this work. Exact locations and alignment of existing buried utility lines are not known. Locate all existing utility lines and determine the requirements for disconnection and capping. Locate all active utilities traversing the area of work to be retained and determine the requirements for protection. Locate all points of connection and crossings by potholes and determine exact horizontal and vertical location prior to commencing the work.

1.5 PROTECTION

- A. Protection and Restoration of Surface: Protect newly graded areas from traffic, erosion, and settlements. Repair and reestablish damaged or eroded slopes, elevations or grades and restore surface construction prior to acceptance. Provide erosion control to prevent water-borne soil from leaving the work area by means of straw bale dikes or sand bags. The Contractor shall be responsible to clean up any soil deposited in the public right-of-way or on adjacent property. The Contractor shall be responsible to protect storm drain catch basins with sand bags and to prevent sediment from entering the storm drain system during construction.

1.6 RELATED WORK IN OTHER SECTIONS

The following work specified in other sections applies to the work of this Section, including but not limited to:

- A. Div 1 as if fully repeated here in.
- B. Div 31

1.7 SAFETY DURING CONSTRUCTION

- A. The Contractor shall assume sole and complete responsibility for job site conditions during the course of construction of the project, including safety of all persons and property. This requirement shall be made to apply continuously and not be limited to normal working hours. Refer to Part Three of this Section and Division 1 for additional requirements.

PART 2 PRODUCTS

2.1 1 MATERIALS

- A. Forms: Comply with Section 303-5 of the Standard Specifications.
- B. Aggregates: Clean, normal sand gravel aggregates conforming to Sections 200-1.4 and 200-1.5 of the Standard Specifications for Public Works Construction.
- C. Form release agent: Colorless form coating compounds that will not bond with, stain, or adversely effect concrete surfaces.
- D. Reinforcement: Comply with the requirements of Section 201-2 of the Standard Specifications for Public Works Construction. Unless indicated otherwise more restrictive on drawings reinforcement shall consist of:
 - a. **No. 3** deformed steel bars **spaced at 24"** on center each way in **non-vehicle** areas.
 - b. **No. 3** deformed steel bars **spaced at 18"** on center each way in **vehicle** areas.

- E. Concrete – Site Paving
 - 1. Comply with Section 201 of the Standard Specifications for Public Works Construction.
 - 2. Concrete strength:
 - a. **2500 PSI** minimum in **non-vehicle** areas unless otherwise noted more restrictive on drawings or soils report
 - b. **4500 PSI** minimum in **vehicle** areas unless otherwise noted more restrictive on drawings or soils report
 - 3. Maximum slump: 4" unless otherwise noted more restrictive on drawings or soils report.

- F. Finish shall be in accordance with Section 302-6.4 of the Standard Specifications for Public Works Construction. See **Architectural drawings for enhanced concrete finishes required on exterior paving.**

- G. Joint Material
 - 1. Pre-molded expansion Joint Filler, 1/2" thick, depth as required by slab thickness shall comply with Section 201-3.2 of the Standard Specifications for Public Works Construction.
 - 2. Sealant: Per Div 7, "Sealants".

- H. Concrete – Decorative (integral color): See Section 32 51 41.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

- A. Comply with Sections 301-1 and 303-1.2 of the Standard Specifications for Public Works Construction.

3.2 FORMWORK

- A. Comply with Section 303-5.2 of the Standard Specifications for Public Works Construction.

3.3 REINFORCEMENT

- A. Locate, place and support reinforcement as specified in Section 303-1.7 of the Standard Specifications for Public Works Construction.

3.4 CONCRETE PLACEMENT

Comply with the requirements of Section 303-5.3 of the Standard Specifications for Public Works Construction for mixing and placing concrete. Heavy truck traffic shall be restricted from the pavement for at least 28 days. Light truck and automobile traffic may be allowed after 14 days.

- A. Exterior Portland Cement Concrete pavement thickness shall be as indicated per drawings.

3.6 JOINTS

Construct joints in concrete pavement in accordance with Section 302-6.5 of the Standard Specifications for Public Works Construction, and as indicated.

- A. Weakened Plane Joints: Weakened plane joints (tooled or sawed) shall be spaced as shown on the plan, and have a depth of $\frac{1}{4}$ slabthickness.
- B. Expansion Joints: Provide 1/2" minimum pre-molded joint filler with removable plastic cap for expansion joints abutting concrete curbs, catch basins, manholes, structures, walks, building foundations and other fixed objects. Construct joints as shown in Construction Drawings.
- C. All joints shall be sealed in accordance with Div 7, "Sealants".

3.7 CONCRETE FINISHING

- A. Comply with Section 302-6.4 of the Standard Specifications for Public Works Construction. Pavement for **trash enclosures, fuel tank enclosures and steppers**, etc. (medium broom finish) unless otherwise noted on plans. Contractor shall place 4' x 4' mock up field sample for Architect's and Resident Engineer's review prior to ordering mix and installation.

3.8 CURING AND PROTECTION

- A. Comply with Section 302-6.6 of the Standard Specifications for Public Works Construction.
- B. Repair or replace defective or damaged work.

END OF SECTION

SECTION 32 54 00

PAVEMENT MARKINGS AND RELATED SIGNS

PART 1 GENERAL

1.1 SUMMARY

The work includes on-site paint striping and markings, red painted curb, handicap symbols, signs and other painted markings and signs as indicated on the drawings.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A. Standard Specifications:

1. Standard Specifications for Public Works Construction (2012 Edition), "Greenbook", including the latest edition of the City of San Diego Regional Standard Specifications for Public Works Construction (Whitebook) 2012 Edition.
2. California Department of Transportation U.S. Customary Standard Specifications, 2010 Edition.

B. Standard Drawings:

1. City of San Diego Standard Drawings for Public Works Construction, 2012 Edition.
2. California Department of Transportation U.S. Customary Standard Specifications, 2010 Edition.

1.3 SUBMITTALS

A. Certificates of Compliance

1. Paint

1.4 QUALITY ASSURANCE

- ###### A.
- Materials and workmanship specified herein with the referenced Standard Specifications for Public Works Construction shall be in accordance with the referenced articles, sections and paragraphs of the standard except that contractual and payment provisions do not apply.

1.5 ENVIRONMENTAL CONDITIONS

- ###### A.
- Striping and Legends: Apply paint to clean, dry surfaces and unless otherwise approved, only when air and pavement temperatures are above 40 degrees F for oil-based materials, 50 degrees F for water-based materials, and are less than 95 degrees F. Maintain paint temperatures within these same limits.

1.6 EQUIPMENT

- A. Painting Equipment: Use a stripe-painting machine capable of producing marking and striping indicated. Provide equipment having a compressor capacity of at least 105 cubic feet and capable of operating at an air pressure of 125 psi. Provide striping machine with a pointer so the machine will hold exactly to alignment. Provide propelling vehicle with a speedometer or tachometer, and with a suitable device for determining quantity of paint in the container. Mechanically agitate paint while equipment is in operation. Clean paint container and spray nozzles on machine before starting work each day.

1.7 RELATED WORK IN OTHER SECTIONS

The following work specified in other sections applies to the work of this Section, including but not limited to:

- A. Div 1 as if fully repeated here in.

1.8 SAFETY DURING CONSTRUCTION

- A. The Contractor shall assume sole and complete responsibility for job site conditions during the course of construction of the project, including safety of all persons and property. This requirement shall be made to apply continuously and not be limited to normal working hours. Refer to Part Three of this Section and Division 1 for additional requirements.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Paint: Comply with Section 210-1.4 and Table 210-1.5(A) of the Standard Specifications for Public Works Construction, Fast Dry, Color as indicated on plans or in the Standard Drawings.

PART 3 EXECUTION

3.1 PREPARATION

- A. Striping: Allow new pavement surfaces to cure for at least 14 days before striping. Clean pavement surfaces immediately prior to painting with a power broom and then a power blower using compressed air. Thoroughly clean pavement surface of water, oil, grease or other objectionable matter. Do not use solvent material that will damage pavement.
- B. Weather Conditions: Comply with the requirements of Section 310-1.1 of the Standard Specifications for Public Works Construction.

3.2 INSTALLATION

- A. Application: Conform to the requirements of Section 310-1.2 of the Standard Specifications for Public Works Construction.

- B. Colors and Configurations: Parking stall striping shall be white, 4" wide. Striping at accessible parking areas shall be blue, 4" wide.
- C. Painting Various Surfaces:
 - 1. Application: Conform to the provisions of Section 310-5.1.3 of the Standard Specifications for Public Works Construction. Apply one coat of paint at a maximum rate of 110 SF per gallon of paint. Apply to required width, with clean true edges and without sharp breaks. Repaint portion of marking and striping damaged by traffic within 24 hours after applying paint. Repaint existing markings damaged by construction. Striping shall be placed on final wearing course of asphalt concrete pavement only.

END OF SECTION

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SECTION 32 6200

CONCRETE CURBS, GUTTERS AND WALKS

PART 1 GENERAL

1.1 SUMMARY

- A. The work includes all necessary labor and materials for the extent of concrete curbs, gutter and walks as shown on the drawings. All public improvements shall be constructed in accordance with the indicated Standard Drawings. Contractor shall coordinate with Landscape Architectural Plans and other Sections of Work for color and finish of concrete walks.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

- A. Standard Specifications:

- 1. Standard Specifications for Public Works Construction (2012 Edition), "Greenbook", including the latest edition of the City of San Diego Regional Standard Specifications for Public Works Construction (Whitebook) 2012 Edition.

- B. Standard Drawings:

- 1. City of San Diego Standard Drawings for Public Works Construction, 2012 Edition.

1.3 SUBMITTALS

- A. Furnish certified reports of each proposed mix for each type of concrete prior to delivery and installation.

1.4 SITE INSPECTION AND LOCATION OF EXISTING ON-SITE UTILITIES:

- A. Prior to all work of this Section, carefully inspect the entire site and all existing items to be demolished and removed or to be left intact, and determine an orderly sequence for the performance of this work. Exact locations and alignment of existing buried utility lines are not known. Locate all existing utility lines and determine the requirements for disconnection and capping. Coordinate with the respective utility companies for termination of existing utilities that are not to be utilized as part of the proposed development. Locate all active utilities traversing the area of work to be retained and determine the requirements for protection. Locate all points of connection and crossings by potholes and determine exact horizontal and vertical location prior to commencing the work

1.5 PROTECTION

- A. Protection and Restoration of Surface: Protect newly graded areas from traffic, erosion, and settlements. Repair and reestablish damaged or eroded slopes, elevations or grades and restore surface construction prior to acceptance. Provide erosion control to prevent water-borne soil from leaving the work area by means of straw bale dikes or sand bags. The Contractor shall be responsible to clean up any soil deposited in the public right-of-way or on adjacent property. The Contractor shall be responsible to protect storm drain catch basins with sand bags and to prevent sediment from entering the storm drain system during construction.

1.6 RELATED WORK IN OTHER SECTIONS

The following work specified in other sections applies to the work of this Section, including but not limited to:

- A. Div 1 as if fully repeated here in.
- B. Div 31

1.7 SAFETY DURING CONSTRUCTION

- A. The Contractor shall assume sole and complete responsibility for job site conditions during the course of construction of the project, including safety of all persons and property. This requirement shall be made to apply continuously and not be limited to normal working hours. Refer to Part Three of this Section and Division 1 for additional requirements.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Forms: Comply with Section 303-5 of the Standard Specifications for Public Works Construction.
- B. Aggregates: Comply with Sections 200-1.4 and 200-1.5 of the Standard Specifications for Public Works Construction.
- C. Form release agent: Colorless form coating compounds that will not bond with, stain or adversely affect concrete surfaces.
- D. Concrete
 - 1. Comply with the Standard Specifications for Public Works Construction.
 - 2. Concrete strength shall be: **2500 psi** minimum in **non-vehicle** areas unless otherwise noted more restrictive on drawings or soils report. Reinforced per site concrete pavement specification found in separate section of this Technical Specifications.
 - 3. Maximum Slump: 4" otherwise noted more restrictive on drawings
- E. Finish in accordance with Section 303-5.5 of the Standard Specifications for Public Works Construction and as indicated.

F. Joint Material:

1. Pre-molded Expansion Joint Filler: 1/2" thick of pre-molded, resilient, non-bituminous material, in compliance with Section 201- 3.2 of the Standard Specifications for Public Works Construction.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

- A. Comply with Sections 301-1 and 303-1.2 of the Standard Specifications for Public Works Construction.

3.2 FORMWORK

- A. Comply with Section 303-5.2 of the Standard Specifications for Public Works Construction.

3.3 CONCRETE PLACEMENT

- A. Comply with the requirements of Section 303-5.3 of the Standard Specifications for Public Works Construction.

3.4 JOINTS

Locate joints in sidewalk in accordance with Standard Drawings G-9 and G-10. Locate joints in flatwork areas to match existing adjacent work unless otherwise indicated on the Drawings.

- A. General: Construct expansion, weakened-plane (contraction), and construction joints at right angles to the center line, unless otherwise shown, and in accordance with Section 303-5.4 of the Standard Specifications for Public Works Construction.
- B. Weakened-Plane (Contraction) Joints: Provide weakened-plane (contraction) joints, sectioning concrete into areas not to exceed 200 SF or twice the pavement width - whichever is least. Construct weakened-plane joints for a depth equal to at least 1/4 concrete thickness. Form weakened-plane joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer. Tooled joints shall be as indicated on the Drawings.
- C. Construction Joints: Place construction joints at the end of all pours and at location where placement operations are stopped for a period of more than 1/2 hour, except where such pours terminate at expansion joints. Unless indicated otherwise construct joints as full depth butt type joint.
- D. Expansion Joints: Provide pre-molded joint filler with removable plastic cap for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structure, walks and other fixed objects. Locate in slab where indicated, filled to full depth with expansion joint material, in curbs. Locate only 1/2" below top of concrete and seal exposed joints with joint sealer.

3.5 CONCRETE FINISHING

- A. Comply with Section 303-5.5 of the Standard Specification for Public Works Construction.
- B. Broomed finish: Provide a **medium** broom finish for **sidewalks** and **ramps**, unless otherwise indicated on drawings. Provide a **light** broom finish for **curbs** and **gutters**, unless otherwise indicated on drawings. Contractor shall place 4' x 4' mock up field sample for Architect's and Resident Engineer's review prior to ordering mix and installation.

3.6 CURING PROTECTION

- A. Comply with the requirements of Section 303-5.6 of the Standard Specifications for Public Works Construction.
- B. Repair defective or damaged work in accordance with Section 303-5.7 of the Standard Specifications for Public Works Construction.

END OF SECTION

SECTION 32 66 00

EXTERIOR WATER DISTRIBUTION SYSTEM

PART 1 GENERAL

1.1 SUMMARY

- A. The work includes the installation of 2" and 4" fire services, a 2" irrigation service and a 2" domestic water supply. All work associated with the domestic and irrigation services within the right-of-way will be performed by city forces. Contractor to extend services to building or landscape as indicated after the meter. Contractor to excavate, set tapping sleeves/saddles, corporation stops/tapping valve for fire service wet taps; City forces will make wet taps. This Section also includes trench pavement repair for areas crossing existing pavement, as specified in Section 02225, "Excavating, Backfilling and Compacting for Utilities".
- B. The Owner will pay water capacity, wet tap, and installation fees. The Contractor shall make all arrangements to schedule city water utility forces to install services, make wet taps and set meters.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

- A. Standard Specifications:
 - 1. Standard Specifications for Public Works Construction (2012 Edition), "Greenbook", including the latest edition of the City of San Diego Regional Standard Specifications for Public Works Construction (Whitebook) 2012 Edition.
- B. Standard Drawings:
 - 1. City of San Diego Standard Drawings for Public Works Construction, 2012 Edition.
- C. Ninyo & Moore Updated Geotechnical Evaluation, Fire Station 22, 1055 Catalina Boulevard, San Diego, California, Project No. 106297001, report dated March 11, 2011, and Ninyo & Moore, Supplemental Information for the Updated Geotechnical Evaluation, Fire Station 22, 1055 Catalina Boulevard, San Diego, California, Project No. 106297003, report dated March 6, 2015."
- D. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
 - ASTM B 42 (1993) Seamless Copper Pipe, Standard Sizes
 - ASTM D1785 (1994) Poly Vinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80 and 120
 - ASTM D2466 (1994; Rev. A) Poly Vinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40

ASTM D2564 (1993) Solvent Cements for Poly Vinyl Chloride (PVC) Plastic Piping Systems

ASTM D2774 (1994) Underground Installation of Thermoplastic Pressure Piping

ASTM D2855 (1993) Making Solvent Cemented Joints with Poly Vinyl Chloride (PVC) Pipe and Fittings

ASTM F402 (1993) Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings

E. AMERICAN WATER WORKS ASSOCIATION

AWWA C 900 (1989; Addendum 1992) Poly Vinyl Chloride (PVC) Pressure Pipe, 4 inches through 12 inches for Water Distribution

AWWA C 509 (1994) Resilient seated Gate Valve, 3 inches through 12 inches NPS, for Water

AWWA C 800 (1989) Underground Service Line Valves and Fittings

AWWA M 23 (1980) PVC Pipe Design and Installation

F. UNDERGROUND LABORATORIES, INC. (UL)

UL 262 (1994) Gate Valves for Fire Protection Service

UL 312 (1993; R 1994) Check Valves for Fire Protection Service

UL 789 (1993; R 1994) Indicator Posts For Fire Protection Service

G. UNI BELL PLASTIC PIPE ASSOCIATION (UBPPA)

UBPPA UNI B 8 (1986) Direct Tapping of Polyvinyl Chloride (PVC) Pressure Water Pipe

H. City of San Diego Water Utilities Department Approved Materials List, Latest Edition

1.3 SUBMITTALS

A. Manufacturer's Catalog Data

1. Pipe and Fittings
2. Joints and Couplings
3. Valves, including above ground double check detector, post indicator valve and gate valves, reduced pressure Principle Detector Assembly.
4. Valve and Meter Boxes
5. Submit manufacturer's standard drawings or catalog cuts.

B. Certificates of Compliance

1. Pipe and Fittings
2. Pipe Joint Materials
3. Valves
4. Reduced pressure Principle Detector Assembly.

C. Certificates shall attest that products meet the requirements of Water Utilities Department, City of San Diego, and that tests set forth in each applicable referenced publication have been performed, whether specified in that publication to be mandatory or otherwise and that production control tests have been performed at the intervals or frequency specified in the publication. Other tests shall have been performed within 3 years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project.

1.4 DELIVERY

- A. Delivery and Storage: Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store plastic piping and jointing materials under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.
- B. Handling: Handle pipe, fittings, valves, hydrants, and other accessories in a manner to ensure delivery to the trench in sound undamaged condition. Carry, do not drag pipe to the trench. Store plastic piping, jointing materials that are not to be installed immediately, under cover out of direct sunlight.

1.5 SITE INSPECTION AND LOCATION OF EXISTING ON SITE UTILITIES:

- A. Prior to all work of this Section, carefully inspect the entire site and all existing items to be demolished and removed or to be left intact and determine an orderly sequence for the performance of this work. Exact locations and alignment of existing buried utility lines are not known. Locate all existing utility lines and determine the requirements for disconnection and capping. Locate all active utilities traversing the area of work to be retained and determine the requirements for protection. Locate all points of connection and crossings by potholes and determine exact horizontal and vertical location prior to commencing the work.

1.6 PROTECTION

- A. The Contractor shall notify Dig Alert at 1 800 422-4133 at least two days prior to starting work and shall coordinate all work with utility company representatives. The existence and locations of existing underground facilities shown on the drawings were obtained from a search of available records. The Contractor shall take precautionary measures to protect any existing facility shown on the drawings, and any other which is not of record or not shown on the drawings.

B. For all work related to water utilities, the Contractor shall coordinate all work with Water Utilities Department, City of San Diego.

C. Shoring: The California Division Occupational Safety and Health Enforces the requirement that building and construction contractors obtain a permit prior to commencing certain types of hazardous activity, as specified in Section 65000 of the State Labor Code and Section 341 of Title 8 of the California Code of Regulations. These activities include construction of trenches or excavations which are 5' or deeper and into which a person is required to descend, the construction or demolition of any building, structure, falsework, or scaffolding more than three stories high or the equivalent height, and the underground use of diesel engines in work in mines and tunnels. Construction permits are issued by district offices of the division. The San Diego office is located at:

State of California
Department of Industrial Relations
Division of Occupational Safety and Health
7807 Convoy Court, Suite 140
San Diego, CA 92111
(619) 637 5534

1. This project includes trenching in excess of 5' in depth which will require a permit from the California Division of Occupational Safety and Health (CAL OSHA). The Contractor shall be responsible for obtaining the appropriate permit, and shall comply with the requirements of the permit, and with CAL OSHA law.

2. The Contractor shall submit a shoring plan prepared in accordance with CAL-OSHA requirements, to the Owner's Representative for review prior to commencing the work

D. Dewatering: Provide for the disposal of surface and subsurface water which may accumulate in open excavations, unfinished fills, or other low areas. Remove water by trenching where approved, pumping, or other methods to prevent softening of exposed surfaces. Surface dewatering plan shall include the rerouting of any storm water runoff or natural drainage, if necessary, and shall comply with requirements of the City of San Diego, County of San Diego and the California State Water Resource Board.

E. Protection and Restoration of Surface: Protect newly graded areas from traffic, erosion, and settlements. Repair and reestablish damaged or eroded slopes, elevations or grades and restore surface construction prior to acceptance. Provide erosion control to prevent water borne soil from leaving the work area by means of straw bale dikes or sand bags. The Contractor shall be responsible to clean up any soil deposited in the public right-of-way or on adjacent property. The Contractor shall be responsible to protect storm drain catch basins with sand bags and to prevent sediment from entering the storm drain system during construction.

1.7 RELATED WORK IN OTHER SECTIONS

The following work specified in other sections applies to the work of this Section, including but not limited to:

- A. Section 31 22 50 – Excavating, backfilling & Compacting for Utilities.
- B. Section 31 20 00 – Earthwork for Structures and Pavements.
- C. Division 1.

1.8 SAFETY DURING CONSTRUCTION

- A. The Contractor shall assume sole and complete responsibility for job site conditions during the course of construction of the project, including safety of all persons and property. This requirement shall be made to apply continuously and not be limited to normal working hours. Refer to Part Three of this Section and Division 1 for additional requirements.

PART 2 PRODUCTS

2.1 FIRE SERVICE LINE MATERIALS

- A. Piping Materials and Appurtenances shall comply with the requirements of the Water Utilities Department, City of San Diego Standards.
 - 1. PVC Piping shall be Class 200 (DR14).
- B. Valves
 - 1. Comply with the requirements of the Water Utilities Department, City of San Diego Approved Materials List and with the requirements of the Water Utilities Department, City of San Diego Standards.

2.2 WATER SERVICE LINES

- A. Water service laterals shall comply with the requirements of the Water Utilities Department, City of San Diego Standards.
 - 1. The water lateral from the water meter to the building shall be copper pipe. Pipe shall conform to ASTM B 42.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPELINES

- A. Prior to commencing the work, the Contractor shall POTHOLE EXISTING UTILITIES at points of connection and all utility crossings to determine exact location.

- B. Pipe Anchorage: Provide concrete thrust-blocks for 6-inch fire service line in accordance with Standard Drawings W 17 and W 18.
- C. Earthwork and Buried Warning Tape: Perform earthwork operations in accordance with Section 31 22 50, "Excavating, Backfilling and Compacting for Utilities", including installation of buried warning tape.
- D. Disinfection: Disinfect water lines and affected portions of existing potable water lines in accordance with AWWA C651. Apply chlorine by the continuous feed method.

3.2 FIELD QUALITY CONTROL

- A. Field Tests and Inspections: The Contractor shall perform pipeline testing in accordance with Section 306 1.4 of the Standard Specifications for Public Works Construction. The Contractor shall also comply with the requirements of the Water Utilities Department, City of San Diego for testing and inspection. The Contractor shall produce evidence, when required, that any item of work has been constructed in accordance with the drawings and specifications.
- B. Testing Procedure: Test water mains and water service lines in accordance with the applicable specified standard. Test PVC plastic water service lines made with PVC plastic water main pipe in accordance with the requirements of UNI B3 for pressure and leakage tests. Test water service lines in accordance with applicable requirements of AWWA C600 for hydrostatic testing. No leakage will be allowed at pipejoints.
- C. Special Testing Requirements: For pressure test, use a hydrostatic pressure 50 psi greater than the maximum working pressure of the system, except that for those portions of the system having pipe size larger than 2 inches in diameter, hydrostatic test pressure shall be not less than 200 psi. Hold this pressure not less than 2 hours. Prior to the pressure test, fill that portion of the pipeline being tested with water for a soaking period of not less than 24 hours. For leakage test, use a hydrostatic pressure not less than the maximum working pressure of the system. Leakage test may be performed at the same time and at the same test pressure as the pressure test.

END OF SECTION

SECTION 32 72 00

STORM DRAINAGE SYSTEM

PART 1 GENERAL

1.1 SUMMARY

- A. The work includes construction of drainage structures, filter inserts, and the installation of all storm drain lines and appurtenances as indicated on the drawings. This Section also includes trench pavement repair for areas crossing existing pavement, as specified in Section 31 22 50, "Excavating, Backfilling and Compacting for Utilities".

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A. Standard Specifications:

1. Standard Specifications for Public Works Construction (2012 Edition), "Greenbook", including the latest edition of the City of San Diego Regional Standard Specifications for Public Works Construction (Whitebook) 2012 Edition.

B. Standard Drawings:

1. City of San Diego Standard Drawings for Public Works Construction, 2012 Edition.

- C. Ninyo & Moore Updated Geotechnical Evaluation, Fire Station 22, 1055 Catalina Boulevard, San Diego, California, Project No. 106297001, report dated March 11, 2011, and Ninyo & Moore, Supplemental Information for the Updated Geotechnical Evaluation, Fire Station 22, 1055 Catalina Boulevard, San Diego, California, Project No. 106297003, report dated March 6, 2015."

1.3 SUBMITTALS

- A. Certificates of Compliance: Submit certificates attesting that tests set forth in each applicable referenced publication have been performed, whether specified in that publication to be mandatory or otherwise and that production control tests have been performed at the frequency of intervals specified in the publication. Other tests shall have been performed within 3 years of the date of submittal of certificates on the same type, class, grade and size of material as is being provided for the project.

1. Pipe and Fittings
2. Catch Basins and Cleanouts
3. Frames, Grates and Covers

1.4 DELIVERY, STORAGE AND HANDLING

A. Delivery and Storage

1. Piping: Inspect materials delivered to site for damage; store with minimum of handling. Store materials on site in enclosures or under protective coverings. Keep inside of pipes and fittings free of dirt and debris.
2. Metal Items: Check upon arrival; identify and segregate as to types, functions, and sizes. Store off the ground in a manner affording easy accessibility and not causing excessive rusting or coating with grease or other objectionable materials.

- B. Handling: Handle pipe, fittings, and other accessories in a manner to ensure delivery to the trench in sound undamaged condition. Carry, do not drag pipe to trench.

1.5 SITE INSPECTION AND LOCATION OF EXISTING ON SITE UTILITIES:

- A. Prior to all work of this Section, carefully inspect the entire site and all existing items to be demolished and removed or to be left intact, and determine an orderly sequence for the performance of this work exact locations and alignment of existing buried utility lines are not known. Locate all existing utility lines and determine the requirements for disconnection and capping. Locate all active utilities traversing the area of work to be retained and determine the requirements for protection. Locate all points of connection and crossings by potholes and determine exact horizontal and vertical location prior to commencing the work

1.6 PROTECTION

- A. The Contractor shall notify Dig Alert at 1 800 227-2600 at least two days prior to starting work and shall coordinate all work with utility company representatives. The existence and locations of existing underground facilities shown on the drawings were obtained from a search of available records. The Contractor shall take precautionary measures to protect any existing facility shown on the drawings, and any other which is not of record or not shown on the drawings.
- B. For all work related to water utilities, the Contractor shall coordinate all work with Water Utilities Department, City of San Diego.

- C. Shoring: The California Division Occupational Safety and Health Enforces the requirement that building and construction contractors obtain a permit prior to commencing certain types of hazardous activity, as specified in Section 65000 of the State Labor Code and Section 34 1 of Title 8 of the California Code of Regulations. These activities include construction of trenches or excavations which are 5' or deeper and into which a person is required to descend, the construction or demolition of any building, structure, falseworks or scaffolding more than three stories high or the equivalent height, and the underground use of diesel engines in work in mines and tunnels. Construction permits are issued by district offices of the division. The San Diego office is located at:

State of California
Department of Industrial Relations
Division of Occupational Safety and Health
7807 Convoy Court, Suite 140
San Diego, CA 92111
(619) 637 5534

1. This project includes trenching in excess of 5 feet in depth which will require a permit from the California Division of Occupational Safety and Health (CAL OSHA). The Contractor shall be responsible for obtaining the appropriate permit and shall comply with the requirements of the permit, and with CAL OSHA law.
 2. The Contractor shall submit a shoring plan prepared in accordance with CAL-OSHA requirements, to the Owner's Representative for review prior to commencing the work.
- D. Dewatering: Provide for the disposal of surface and subsurface water which may accumulate in open excavations, unfinished fills, or other low areas. Remove water by trenching where approved, pumping, or other methods to prevent softening of exposed surfaces. Surface dewatering plan shall include the rerouting of any storm water runoff or natural drainage, if necessary, and shall comply with requirements of the City of San Diego, County of San Diego and the California State Water Resource Board.
- E. Protection and Restoration of Surface: Protect newly graded areas from traffic, erosion, and settlements. Repair and reestablish damaged or eroded slopes, elevations or grades and restore surface construction prior to acceptance. Provide erosion control to prevent water borne soil from leaving the work area by means of straw bale dikes or sand bags. The Contractor shall be responsible to clean up any soil deposited in the public right of-way or on adjacent property. The Contractor shall be responsible to protect storm drain catch basins with sand bags and to prevent sediment from entering the storm drain system during construction.

1.7 RELATED WORK IN OTHER SECTIONS

The following work specified in other sections applies to the work of this Section, including but not limited to:

- A. Section 31 22 50 - "Excavation, Backfilling and Compaction for Utilities".
- B. Division 1.

1.8 SAFETY DURING CONSTRUCTION

- A. The Contractor shall assume sole and complete responsibility for job site conditions during the course of construction of the project, including safety of all persons and property. This requirement shall be made to apply continuously and not be limited to normal working hours. Refer to Part Three of this Section and Division 1 for additional requirements.

PART 2 PRODUCTS

2.1 PIPING MATERIALS

- A. Pipe and fittings: Provide one of the following, however, any pipe over 18 inch in diameter shall be RCP
 - 1. Polyvinyl Chloride Pipe (PVC): PVC pipe and fittings shall conform to the requirements of Section 207 17 of the Standard Specifications for Public Works Construction.
 - 2. Corrugated Plastic Piping (HDPE): HDPE pipe and fittings shall conform to the requirements of Section 207 18 of the Standard Specifications for Public Works Construction.
 - 3. RCP pipe shall conform to the requirements of Section 207-2 of the Standard Specifications for Public Works Construction.

2.2 PRE CAST CATCH BASINS

- A. Pre cast catch basins shall be as indicated and capable of supporting H20 loading.
- B. Catch basin gratings shall be traffic rated for H20 loading, galvanized and shall conform to ADA requirements.

2.3 CLEANOUT

- A. Cleanout shall be in accordance with Civil Drawings.

2.4 BURIED WARNING AND IDENTIFICATION TAPE

- A. Shall conform to the requirements of paragraph 2.02, Section 31 22 50 "Excavation, Backfilling and Compacting for Utilities", of these specifications.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPELINES AND APPURTENANT CONSTRUCTION

- A. Prior to commencing the work the Contractor shall POTHOLE EXISTING UTILITIES at points of connection and all utility crossings to determine exact location.
- B. General Requirements for Installation of Pipelines. These requirements shall apply to pipeline installation.
 - 1. Earthwork: Perform earthwork operations in accordance with Section "Excavation, Backfilling and Compacting for Utilities".
 - 2. Pipe Laying and Jointing: Conform to the provisions of Section 306 1.2 of the Standard Specifications for Public Works Construction.
 - 3. Installation of Buried Warning Tape: Install buried warning tape in accordance with the requirements of Section, "Excavation, Backfilling and Compacting for Utilities", of these specifications.

3.2 INSTALLATION OF PRECAST DRAINAGE CATCHBASIN AND CLEANOUT

- A. Install pre cast drainage catch basins in locations indicated. Provide 6-inch thick concrete floor if not integral with box or as directed by the Civil Drawings.

3.3 METAL WORK

- A. Workmanship and Finish: Perform metal work so that workmanship and finish will be equal to the best practice in modern structural shops and foundries. Form iron and steel to shape and size with sharp lines and angles. Do shearing and punching so that clean true lines and surfaces are produced. Make castings sound and free from warp, cold shuts, and blowholes that may impair their strength or appearance. Give exposed surfaces a smooth finish with sharp well defined lines and arises. Provide rabbits, lugs, and brackets wherever necessary for fitting and support.

3.4 FIELD QUALITY CONTROL

- A. Field Tests and Inspections: The Contractor shall be able to produce evidence, when required, that each item of work has been constructed properly in accordance with the drawings and specifications.

END OF SECTION

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SECTION 32 73 00

EXTERIOR SANITARY SEWER SYSTEM

PART 1 GENERAL

1.1 SUMMARY

- A. The work includes the installation of sewer laterals and appurtenances as indicated on the drawings to connect to the existing sewer indicated.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

- A. Standard Specifications:

- 1. Standard Specifications for Public Works Construction (2012 Edition), "Greenbook", including the latest edition of the City of San Diego Regional Standard Specifications for Public Works Construction (Whitebook) 2012 Edition.

- B. Standard Drawings:

- 1. City of San Diego Standard Drawings for Public Works Construction, 2012 Edition.

- C. UNI BELL PLASTIC PIPE ASSOCIATION (UNI)

- UNI B5 (1982) Installation of Polyvinyl Chloride (PVC) Sewer Pipe

- UNI B6 (1990) Low Pressure Air Testing of Installed Sewer Pipe

1.3 DESCRIPTION

- A. Sanitary Sewer Gravity Pipeline: The system consists of polyvinyl chloride (PVC) plastic pipe, cleanout, and connections to existing manhole.

1.4 SUBMITTALS

- A. Certificates of Compliance

- 1. Pipe and Fittings
- 2. Pipe Joint Materials
- 3. Frames and Covers

- B. Certificates shall attest that tests set forth in each applicable referenced publications have been performed, whether specified in that publication to be mandatory or otherwise. Production control tests shall have been performed at the intervals or frequency specified in the referenced publication. Other tests shall have been performed within 3 years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage

- 1. Piping: Inspect materials delivered to site for damage; store with minimum of handling. Store materials on site in enclosures or under protective coverings. Store plastic piping, jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.

- B. Handling: Handle pipe, fittings, and other accessories in such manner as to ensure delivery to the trench in sound undamaged condition. Carry do not drag, pipe to trench.

1.6 PROTECTION

- A. The Contractor shall notify Dig Alert at 1 800 422-4133 at least two days prior to starting work and shall coordinate all work with utility company representatives. The existence and locations of existing underground facilities shown on the drawings were obtained from a search of available records. The Contractor shall take precautionary measures to protect any existing facility shown on the drawings, and any other which is not of record or not shown on the drawings.

- B. For all work related to water utilities, the Contractor shall coordinate all work with Water Utilities Department, City of San Diego.

- C. Shoring: The California Division Occupational Safety and Health Enforces the requirement that building and construction contractors obtain a permit prior to commencing certain types of hazardous activity, as specified in Section 65000 of the State Labor Code and Section 34 1 of Title 8 of the California Code of Regulations. These activities include construction of trenches or excavations which are 5' or deeper and into which a person is required to descend, the construction or demolition of any building, structure, falseworks or scaffolding more than three stories high or the equivalent height, and the underground use of diesel engines in work in mines and tunnels. Construction permits are issued by district offices of the division. The San Diego office is located at:

State of California
Department of Industrial Relations
Division of Occupational Safety and Health
7807 Convoy Court, Suite 140
San Diego, CA 92111
(619) 637 5534

1. This project includes trenching in excess of 5 feet in depth which will require a permit from the California Division of Occupational Safety and Health (CAL OSHA), The Contractor shall be responsible for obtaining the appropriate permit and shall comply with the requirements of the permit, and with CAL OSHA law.
 2. The Contractor shall submit a shoring plan prepared in accordance with CAL-OSHA requirements, to the Owner's Representative for review prior to commencing the work.
- D. Dewatering: Provide for the disposal of surface and subsurface water which may accumulate in open excavations, unfinished fills, or other low areas. Remove water by trenching where approved, pumping, or other methods to prevent softening of exposed surfaces. Surface dewatering plan shall include the rerouting of any storm water runoff or natural drainage, if necessary, and shall comply with requirements of the City of San Diego / County of San Diego and the California State Water Resource Board.
- E. Protection and Restoration of Surface: Protect newly graded areas from traffic, erosion, and settlements. Repair and reestablish damaged or eroded slopes, elevations or grades and restore surface construction prior to acceptance. Provide erosion control to prevent water borne soil from leaving the work area by means of straw bale dikes or sand bags. The Contractor shall be responsible to clean up any soil deposited in the public right of-way or on adjacent property. The Contractor shall be responsible to protect storm drain catch basins with sand bags and to prevent sediment from entering the storm drain system during construction.

1.7 RELATED WORK IN OTHER SECTIONS

The following work specified in other sections applies to the work of this Section, including but not limited to:

- A. 31 22 50, "Excavation, Backfilling and Compaction for Utilities".
- B. Division 1.

1.8 SAFETY DURING CONSTRUCTION

The Contractor shall assume sole and complete responsibility for job site conditions during the course of construction of the project, including safety of all persons and property. This requirement shall be made to apply continuously and not be limited to normal working hours. Refer to Part Three of this Section and Division 1 for additional requirements.

PART 2 PRODUCTS

2.1 PIPING MATERIALS

A. PVC Plastic Gravity Sewer Piping

1. PVC Plastic Gravity Pipe and Fittings: Conform to the provisions of Section 207-17 of the Standard Specifications for Public Works Construction and the City of San Diego Supplements.
2. PVC Plastic Gravity Joints and Jointing Material: Conform to the provisions of Section 207-17 of the Standard Specifications for Public Works Construction and the City of San Diego Supplements.

2.2 CLEANOUT

- #### **A. Provide in accordance with Standard Drawings SDS-102/103.**

2.3 SEWER LATERAL

- #### **A. Provide in accordance with Standard Drawing SDS-105.**

PART 3 EXECUTION

3.1 INSTALLATION OF PIPELINES AND APPURTENANT CONSTRUCTION

- #### **A. The Contractor shall notify DIG ALERT at 1 800 422-4133 at least two (2) days prior to starting work and shall coordinate all work with utility company representatives. The existence and locations of existing underground facilities shown on the plans were obtained from a search of available records. The Contractor shall take precautionary measures to protect any existing facility shown on the plans, and any other which is not of record or not shown on the plans.**
1. The Contractor shall coordinate all work with the City of San Diego, Field Engineering Division, Engineering and Capital Projects Department Resident Engineer prior to excavating. Additional utilities may exist on site which are not of record, not indicated on the plans, or not located by "DIGALERT". The Contractor shall make every effort to locate and protect possible underground utilities prior to excavating.
 2. The Contractor shall take precautionary measures to avoid overhead power lines.

B. Install sanitary pipelines and appurtenances in conformance with the provisions of Section 306-1.2 of the Standard Specifications for Public Works Construction, and the following requirements:

1. Location: The work covered by this section shall terminate at a point approximately 5 feet from the building, or as indicated. Where the location of the sewer is not clearly defined by dimensions on the drawings, do not lay sewer line closer horizontally than 10 feet to a water main or service line. Where sanitary sewer lines pass below water lines, lay pipe so that no joint in the sewer line will be closer than 3 feet, horizontal distance, to the water line.
2. Earthwork and Buried Warning Tape: Perform earthwork operations in accordance with Section, "Excavating, Backfilling and Compacting for Utilities", including installation of buried warning tape.
3. Pipe Laying and Jointing: Inspect each pipe and fitting before and after installation; replace those found defective and remove from site. Provide proper facilities for lowering sections of pipe into trenches. Lay non pressure pipe with the bell or groove ends in the upgrade direction. Adjust spigots in bells and tongues in grooves to give a uniform space all around. Blocking or wedging between bells and spigots will not be permitted. Replace by one of the proper dimensions, pipe or fittings that do not allow sufficient space for installation of joint material. At the end of each workday, close open ends of pipe temporarily with wood blocks or bulkheads. Provide batterboards not more than 25' apart in trenches for checking and ensuring that pipe invert elevations are as indicated.

C Laser beam method may be used in lieu of batterboards for the same purpose.

3.2 FIELD QUALITY CONTROL

- A. Field Tests and Inspections: The Contractor shall be able to produce evidence, when required, that each item of work has been constructed in accordance with the drawings and specifications.
- B. Tests for Nonpressure Lines
 1. Leakage Tests: Perform tests in accordance with Section 306-1.4 of the Standard Specifications.

END OF SECTION

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Project Manual

For

**Point Loma Temporary
Fire Station No. 22**

**1055 Catalina Boulevard, San Diego, California 92107
Parcel ID No. 531-110-11-00**

July 17, 2015

Architect

NADEL STUDIO ONE, INC

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Suite 407

San Diego, CA 92121

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SECTION 024116

STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of site improvements.
 - 2. Disconnecting, capping or sealing, and abandoning in-place site utilities.

1.2 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.3 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

- A. Engineering Survey: Submit engineering survey of condition of building.
- B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, and for dust control. Indicate proposed locations and construction of barriers.
- C. Predemolition photographs or video.
- D. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician.

1.5 CLOSEOUT SUBMITTALS

- A. Inventory of items that have been removed and salvaged.

1.6 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

1.7 FIELD CONDITIONS

- A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- B. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before start of the Work.
 - 2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- C. On-site storage or sale of removed items or materials is not permitted.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting demolition operations.
- B. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.
- C. Inventory and record the condition of items to be removed and salvaged.

3.2 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Utilities to be Disconnected: Locate, identify, disconnect, and seal or cap off utilities serving buildings and structures to be demolished.
 - 1. Owner will arrange to shut off utilities when requested by Contractor.
 - 2. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
 - 3. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.
 - 4. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.4 PROTECTION

- A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.
- B. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.
- C. Existing Utilities to Remain: Maintain utility services to remain and protect from damage during demolition operations. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
- D. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated.

1. Protect adjacent buildings and facilities from damage due to demolition activities.
 2. Protect existing site improvements, appurtenances, and landscaping to remain.
 3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
 4. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 5. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
 6. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
 7. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.
- E. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.5 DEMOLITION

- A. General: Demolish indicated buildings and site improvements completely as indicated on Demolition Drawings. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
 2. Maintain fire watch during and for at least 2 hours after flame-cutting operations.
 3. Maintain adequate ventilation when using cutting torches.
 4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed trafficways if required by authorities having jurisdiction.
 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.
- C. Explosives: Use of explosives is not permitted.
- D. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.
- E. Existing Utilities: Abandon existing utilities and below-grade utility structures that are within 5 feet outside footprint indicated for new construction. Abandon utilities outside this area.
- F. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials according to backfill requirements.
- G. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.6 CLEANING

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
- B. Do not burn demolished materials.
- C. Clean adjacent improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.

END OF SECTION

SECTION 055000

METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Metal bollards.
 - 2. Wrought iron fencing.

1.2 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details.

PART 2 - PRODUCTS

2.1 METALS

- 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.
- B. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.
- C. Wrought Iron Shapes: To match existing.

2.2 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting."
- B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- C. Concrete: Comply with requirements for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

2.3 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
- C. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

2.4 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 40 steel pipe.

2.5 WROUGHT IRON FENCING

- A. Fabricate wrought iron fencing shapes to match existing.

2.6 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.

2.7 STEEL AND IRON FINISHES

- A. Shop prime steel items except portions to be embedded in concrete.
- B. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Placement: Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, and true; and measured from established lines and levels.

3.2 INSTALLING METAL BOLLARDS

- A. 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.
- B. Fill bollards solidly with concrete, mounding top surface to shed water.

3.3 INSTALLING WROUGHT IRON FENCING

- A. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
- B. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
- C. Set posts plumb within a tolerance of 1/16 inch in 3 feet.

3.4 ANCHORING FENCING POSTS

- A. Use metal sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.

3.5 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

END OF SECTION

SECTION 099113

EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
 - 1. Steel.
 - 2. Galvanized metal.

- B. Surface preparation and field painting of exposed items and surfaces.
 - 1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
 - 2. Field finish coating of shop or factory primed and prefinished items. Refer to individual Sections for priming requirements.
 - 3. Finish coatings schedule.
 - 4. Preparation work and coatings specified in this Section are in addition to shop and factory applied finishes and surface treatment specified in other Sections.
 - 5. Paint all other items unless specifically indicated not to be painted.
 - 6. Color schedule.

- C. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
 - 1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.

1.2 DEFINITIONS

- A. Conform to PDCA Glossary for interpretation of terms used in this Section except as modified below.

- B. Exposed Surfaces: Surfaces of products, assemblies, and components visible from any angle after final installation. Includes internal surfaces visible when operable doors, panels or drawers are open, and surfaces visible behind registers, grilles, or louvers.

- C. Concealed Surfaces: Surfaces permanently hidden from view in finished construction and which are only visible after removal or disassembly of part or all of product or assembly.

- D. Gloss Levels
 - 1. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
 - 2. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
 - 3. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
 - 4. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
 - 5. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

6. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
7. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

E. System DFT: Dry film thickness of entire coating system unless otherwise noted.

1.3 ACTION SUBMITTALS

- A. Product Data: For each paint system indicated. Include block fillers and primers.
1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
1. Submit Samples on rigid backing, 8 inches square.
 2. Step coats on Samples to show each coat required for system.
 3. Label each coat of each Sample.
 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 2. Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 3. VOC content.

1.4 INFORMATIONAL SUBMITTALS

- A. Certifications specified in Quality Assurance article.
- B. Qualification Data: Applicator's qualification data.
- C. Manufacturer's instructions.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

- A. Field Samples: Apply field 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 field samples.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of field samples does not constitute approval of deviations from the Contract Documents contained in field samples unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
 1. Add other requirements to suit Project.
 2. Product name or title of material.
 3. Product description (generic classification or binder type).
 4. Manufacturer's stock number and date of manufacture.
 5. Contents by volume, for pigment and vehicle constituents.
 6. Thinning instructions.
 7. Application instructions.
 8. Color name and number.
 9. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.8 FIELD CONDITIONS

- A. Environmental Conditions: Comply with more restrictive of following or manufacturer's requirements under which systems can be applied.
 1. Provide illumination of not less than 80 footcandles measured mid-height at substrate surface during application of coatings.
 2. Apply water reducible coatings only when ambient and surface temperatures are between 50 degrees F and 90 degrees F.
 3. Apply solvent reducible coatings only when ambient and surface temperatures are between 45 degrees F and 90 degrees F.
 4. Do not apply coatings under any of following conditions:
 - a. When surfaces are damp or wet.
 - b. During rain, fog, or mist.
 - c. When relative humidity is less than 20 percent or exceeds 85 percent.
 - d. When temperature is less than 5 degrees F above dew point.
 - e. When dust may be generated before coatings have dried.
 - f. In direct sunlight.
 - g. When wind velocity is above 20 mph.
 5. Application of coatings may continue during inclement weather provided work areas and surfaces to be coated are enclosed and specified environmental conditions are maintained.

1.9 WARRANTY

- A. Warrant installation to be free from defects in material and workmanship for 5 years.
- B. Repair or replace defects occurring during warranty period.
 1. Defects include but are not limited to pinholes, crazing or cracking, loss of adhesion to substrate, deficient thickness, improper materials and workmanship.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Akzo Nobel.
 2. Benjamin Moore & Co.
 3. Dunn-Edwards Corporation.
 4. Frazee Paint; Comex Group.
 5. Kelly-Moore Paint Company Inc.
 6. Glidden Professional.
 7. PPG Paints.
 8. Sherwin-Williams Company (The).
 9. Tnemec.
 10. Vista Paint.

2.2 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. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
- C. Coatings:
1. Ready-mixed, factory tinted, best professional grade produced by manufacturer.
 2. Use manufacturer's appropriate base materials to achieve required colors.
 3. Fully grind pigments to maintain soft paste consistency in vehicle.
 4. Capable of being dispersed into uniform, homogeneous mixture.
 5. Possess good flowing and brushing properties.
 6. Capable of drying or curing free of streaks or sags, and yielding specified finish.
- D. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.
- E. Low-Emitting Materials: Interior paints and coatings 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."
- F. Paint Maximum Product Emissions Limits: Top coat and primer interior paints must meet or not exceed the VOC (Volatile Organic Compounds) limits of the current requirements of Green Seal Standards GS-11 - Paints in the building, and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.
- G. Cal-GREEN Requirements for typical paint coatings:
1. Primers, Sealers, and Undercoaters: 100 grams per liter of product minus water
 2. Flats: 50 grams per liter of product minus water
 3. Non-flats: 100 grams per liter of product minus water

4. Non-flat High Gloss: 150 grams per liter of product minus water
5. Dry-Fog Coatings: 150 g/L.
6. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
7. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
8. Floor Coatings: 100 g/L.
9. Shellacs, Clear: 730 g/L.
10. Shellacs, Pigmented: 550 g/L.

2.3 PRIMERS/SEALERS

- A. Exterior Ferrous-Metal Primer: Factory-formulated rust-inhibitive metal primer for exterior application.
 1. Akzo Nobel; 4160-XXXX Devguard Multi-Purpose Tank & Structural Primer. Applied at a dry film thickness of not less than 2.0 mils.
 2. Benjamin Moore and Company; Super Spec HP Acrylic Metal Primer #P04. Applied at a dry film thickness of not less than 1.7 mil.
 3. Dunn-Edwards Corporation; BRPR00-1 Bloc-Rust Premium, Interior / Exterior, Red Oxide or White, Waterborne Alkyd Rust Preventative Metal Primer: Applied at a dry film thickness of not less than 2.0 mils
 4. Frazee Industries; C309 Ultratech Universal Acrylic Metal Primer: Applied at a dry film thickness of not less than 1.5 mils.
 5. Kelly-Moore; 1711 Kel-Guard Alkyd White Rust Inhibitive Primer: Applied at a dry film thickness of not less than 2.0 mils.
 6. PPG Paints; Speedhide Alkyd Metal Primer 6-208. Applied at a dry film thickness of not less than 2.3 mils or Water Based option; Pitt Tech Plus DTM Acrylic Primer 90-912 Applied at a dry film thickness of not less than 2.0 mils.
 7. Sherwin-Williams; Kem Kromik Universal Metal Primer B50NZ6/B50WZ1: Applied at a dry film thickness of not less than 3.0 mils If a waterbased primer is desired, use S-W Pro Industrial ProCryl Universal Acrylic Primer, B66W310. Applied at a dry film thickness of not less than 3.0 mils.
 8. Tnemec; Series 115 Uni-Bond DF. Applied at a dry film thickness rate of not less than 3.0 mils DFT.
 9. Vista Paint Corporation: 4600 Uniprime II at a dry film thickness of not less than 2.0 mil.

- B. Exterior Galvanized Metal Primer: Factory-formulated galvanized metal primer for exterior application.
 1. Akzo Nobel; 4160-XXXX Devguard Multi-Purpose Tank & Structural Primer: Applied at a dry film thickness of not less than 2.0 mils.
 2. Akzo Nobel; 4020-XXXX Devflex DTM Flat Interior/Exterior Waterborne Primer & Finish: Applied at a dry film thickness of not less than 2.2 mils.
 3. Benjamin Moore and Company; Super Spec HP Acrylic Metal Primer #P04. Applied at a dry film thickness of not less than 1.7 mil.
 4. Dunn-Edwards Corporation; UGPR00-1 Ultra-Grip Premium, Ultra-Low VOC, Interior / Exterior Acrylic Multi-Surface Primer: Applied at a dry film thickness of not less than 1.5 mils.
 5. Frazee Industries; C309 Ultratech Universal Acrylic Metal Primer: Applied at a dry film thickness of not less than 1.7 mils.
 6. Kelly-Moore; 1722 Kel-Guard Acrylic Galvanized Iron Primer: Applied at a dry film thickness of not less than 1.8 mils.
 7. Kelly-Moore; 5725 DTM-Acrylic Metal Primer: Applied at a dry film thickness of not less than 1.8 mils.
 8. PPG Paints; Pitt Tech Plus DTM Acrylic Primer 90-912 Applied at a dry film thickness of not less than 2.0 mils.
 9. Sherwin-Williams recommends using primer below under full-gloss acrylic-enamel and full-gloss alkyd-enamel finishes.

10. Sherwin-Williams; S-W Pro Industrial ProCryl Universal Acrylic Primer, B66W310. Applied at a dry film thickness of not less than 3.0 mils.
11. Tnemec:
 - a. Under Acrylics: Series 115 Uni-Bond DF; Applied at a dry film thickness rate of not less than 3.0 mils.
 - b. Under Urethane: Series L69 H.B. Epoxoline II; Applied at a dry film thickness rate of not less than 3.0 mils.
12. Vista Paint Corporation: 4600 Uniprime II at a dry film thickness of not less than 2.0 mil.

2.4 WATER-BASED PAINTS

- A. Exterior Semigloss Acrylic Enamel: Factory-formulated semigloss waterborne acrylic-latex enamel for exterior application.
 1. Benjamin Moore and Company: Ultra Spec EXT Gloss Finish N449. Applied at a dry film thickness of not less than 1.5 mil.
 2. Dunn-Edwards Corporation; SSSL50 Spartashield Exterior, Ultra-Low, 100% Acrylic Semi-Gloss Paint: Applied at a dry film thickness of not less than 1.5 mils.
 3. Frazee Industries; 124 Mirro Glide Semi-Gloss Interior/Exterior Acrylic Finish: Applied at a dry film thickness of not less than 1.5 mils.
 4. Glidden Professional; 2416-XXXX Ultra Hide 150 Exterior 100 Percent Acrylic Semi-Gloss Finish: Applied at a dry film thickness of not less than 1.6 mils.
 5. Kelly-Moore; 1250 Acry-Lustre Exterior Semi-Gloss Acrylic Finish: Applied at a dry film thickness of not less than 1.6 mils.
 6. PPG Paints; Speedhide Exterior 100% Acrylic Semi-Gloss Latex 6-900XI Series. Applied at a dry film thickness of not less than 1.5 mils.
 7. Sherwin-Williams; A-100 Latex Gloss A8 Series: Applied at a dry film thickness of not less than 1.3 mils.
 8. Tnemec; Series 1029 Enduratone; Applied at a dry film thickness rate of not less than 2.0 mils.
 9. Vista Paint Corporation: 4600 Uniprime II at a dry film thickness of not less than 2.0 mil.

2.5 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
 1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 2. Testing agency will perform tests for compliance with product requirements.
 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application. Comply with procedures specified in PDCA P4.
 1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.

- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.
- E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- G. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 - 3. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. 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.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.6 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. 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.
- D. Provide "Wet Paint" signs and other methods to protect newly coated surfaces. Remove when directed or when no longer needed.
- E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.7 EXTERIOR PAINTING SCHEDULE

- A. Steel Substrates:
 - 1. High-Performance Architectural Latex System:
 - a. Prime Coat: Primer, alkyd, anti-corrosive, for metal.
 - b. Prime Coat: Shop primer specified in Section where substrate is specified.
 - c. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3).

- B. Galvanized-Metal Substrates:
1. Latex System:
 - a. Prime Coat: Primer, galvanized, water based.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4).

END OF SECTION

SECTION 101453

TRAFFIC SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Metal traffic signs.

1.2 ACTION SUBMITTALS

- A. Shop Drawings: For panel signs.
 1. Include fabrication and installation details and attachments to other work.
 2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 3. Show message list, timesteps, graphic elements, and layout for each sign at least quarter size.
- B. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

1.3 QUALITY ASSURANCE

- A. Provide traffic signs complying with the "Manual on Uniform Traffic Control Devices."

PART 2 - PRODUCTS

2.1 SIGNS

- A. Panel Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 1. Solid-Sheet Sign: Aluminum sheet with finish specified in "Painted Finish and Graphics" Subparagraph below and as follows:
 - a. Thickness: 0.080 inch.
 - b. Surface-Applied Graphics: Applied paint.
 2. Sign-Panel Perimeter: Finish edges smooth.
 - a. Corner Condition in Elevation: Rounded.
 3. Mounting: Post mounted.
 4. Painted Finish and Graphics: Manufacturer's standard, factory-applied exterior-grade sign paint.

2.2 PANEL-SIGN MATERIALS

- A. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- B. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.3 ACCESSORIES

- A. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
 - 1. Provide galvanized finish.

2.4 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
 - 4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Post Mounting: Anchor posts in place with concrete footings. Center and align posts in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION

SECTION 311000

SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Protecting existing vegetation to remain.
 - 2. Removing existing vegetation.
 - 3. Clearing and grubbing.
 - 4. Stripping and stockpiling topsoil.
 - 5. Temporary erosion and sedimentation control.

1.2 MATERIAL OWNERSHIP

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

1.3 FIELD 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 trafficways if required by Owner or authorities having jurisdiction.
- B. Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Satisfactory Soil Material: Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed according to requirements in Section 015639 "Temporary Tree and Plant Protection."
- 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 erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

3.3 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - 1. Grind down stumps and remove roots larger than 3 inches in diameter, obstructions, and debris to a depth of 18 inches below exposed subgrade.
 - 2. Use only hand methods or air spade for grubbing within protection zones.
- B. 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, and compact each layer to a density equal to adjacent original ground.

3.4 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth of 6 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

3.5 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. 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.

END OF SECTION

SECTION 313116

TERMITE CONTROL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Soil treatment.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include the EPA-Registered Label for termiticide products.

1.3 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Soil Treatment Application Report: Include the following:
 1. Date and time of application.
 2. Moisture content of soil before application.
 3. Termiticide brand name and manufacturer.
 4. Quantity of undiluted termiticide used.
 5. Dilutions, methods, volumes used, and rates of application.
 6. Areas of application.
 7. Water source for application.
- C. Sample Warranties: For special warranties.

1.4 WARRANTY

- A. Soil Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work consisting of applied soil termiticide treatment will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT

- A. Termiticide: EPA-Registered termiticide acceptable to authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation.
 1. Service Life of Treatment: Soil treatment termiticide that is effective for not less than five years against infestation of subterranean termites.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Remove extraneous sources of wood cellulose and other edible materials, such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.
- B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated.

3.2 APPLYING SOIL TREATMENT

- A. Application: Mix soil treatment termiticide solution to a uniform consistency. Distribute treatment uniformly. Apply treatment at the product's EPA-Registered Label volume and rate for maximum specified concentration of termiticide to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction.
 - 1. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
 - 2. Foundations: Soil adjacent to and along the entire inside perimeter of foundation walls; along both sides of interior partition walls; around plumbing pipes and electric conduit penetrating the slab; around interior column footers, piers, and chimney bases; and along the entire outside perimeter, from grade to bottom of footing.
 - 3. Penetrations: At expansion joints, control joints, and areas where slabs and below-grade walls will be penetrated.
- B. Post warning signs in areas of application.
- C. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION

SECTION 321713

PARKING BUMPERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes wheel stops.

1.2 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 PARKING BUMPERS

- A. Concrete Wheel Stops: Precast, steel-reinforced, air-entrained concrete, 4000-psi minimum compressive strength. Provide chamfered corners and a minimum of two factory-formed or -drilled vertical holes through wheel stop for anchoring to substrate.

2.2 ACCESSORY MATERIALS

- A. Mounting Hardware: Galvanized-steel spike or dowel, 1/2-inch diameter, 10-inch minimum length.
- B. Adhesive: Standard epoxy construction adhesive suitable for bonding concrete to asphalt and concrete surfaces.
 - 1. Comply with VOC and chemical component limits of SCAQMD Rule No. 1168 and CALGreen Table 5.504.4.1 Adhesive VOC Limit requirements.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install wheel stops according to manufacturer's written instructions unless otherwise indicated.
- B. Install wheel stops in bed of adhesive before anchoring.
- C. Securely anchor wheel stops to pavement with hardware in each preformed vertical hole in wheel stop as recommended in writing by manufacturer.

END OF SECTION

SECTION 321723

PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes painted markings applied to asphalt and concrete pavement.

1.2 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 PAVEMENT-MARKING PAINT

- A. Pavement-Marking Paint: MPI #32, alkyd traffic-marking paint.
 - 1. Colors: As indicated.
- B. Paint Maximum Product Emissions Limits: Top coat and primer interior paints must meet current requirements for VOC limits of SCAQMD Rule No. 1113 and CALGreen Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.
 - 1. CALGreen Requirements for typical paint coatings:
 - a. Primers, Sealers, and Undercoaters: 100 grams per liter of product minus water.
 - b. Flats: 50 grams per liter of product minus water.
 - c. Non-flats: 100 grams per liter of product minus water.
 - d. Non-flat High Gloss: 150 grams per liter of product minus water.

PART 3 - EXECUTION

3.1 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. Apply paint so that it cannot run beneath the stencil.

END OF SECTION

SECTION 321726

TACTILE WARNING SURFACING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Cast-in-place detectable warning tiles.

1.2 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 TACTILE WARNING SURFACING, GENERAL

- A. Accessibility Requirements: Comply with applicable provisions in Title 24 and the "2010 ADA Standards" for tactile warning surfaces.

2.2 DETECTABLE WARNING TILES

- A. Cast-in-Place Detectable Warning Tiles: Accessible truncated-dome detectable warning tiles configured for setting flush in new concrete walkway surfaces, with slip-resistant surface treatment on domes and field of tile.
 1. Material: Stainless steel, cast-fiber-reinforced polymer, or molded glass- and carbon-fiber-reinforced polyester.
 2. Color: As indicated on Drawings.
 3. Dome Spacing and Configuration: 2.35-inch spacing, in square pattern.
 4. Mounting:
 - a. Permanently embedded detectable warning tile wet-set into freshly poured concrete.

PART 3 - EXECUTION

3.1 INSTALLATION OF TACTILE WARNING SURFACING

- A. General: Prepare substrate and install tactile warning surfacing according to manufacturer's written instructions unless otherwise indicated.
- B. Place tactile warning surfacing units in dimensions and orientation indicated. Comply with location requirements of AASHTO MP 12.
- C. Cast-in-Place Detectable Warning Tiles: Set each detectable warning tile accurately and firmly in place and completely seat tile back and embedments in wet concrete by tamping or vibrating. Set surface of tile flush with surrounding concrete and adjacent tiles. Remove concrete from tile surfaces and clean using methods recommended in writing by manufacturer.
- D. Remove and replace tactile warning surfacing that is broken or damaged or does not comply with requirements in this Section. Remove in complete sections from joint to joint unless otherwise approved by Architect. Replace using tactile warning surfacing installation methods acceptable to Architect.

- E. Protect tactile warning surfacing from damage and maintain free of stains, discoloration, dirt, and other foreign material.

END OF SECTION

SECTION 323113

CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Chain-link fences.
 - 2. Gates: Manual, swing.
 - 3. Gates: Motor operated, horizontal slide.

- B. Related Sections:
 - 1. Section 033000 "Cast-in-Place Concrete" for cast-in-place concrete.

1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design chain-link fences and gates, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

- B. Structural Performance: Chain-link fence and gate framework 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. Minimum Post Size: Determine according to ASTM F 1043 for framework up to 12 feet high, and post spacing not to exceed 10 feet.
 - 2. Minimum Post Size and Maximum Spacing: Determine according to CLFMI WLG 2445, based on mesh size and pattern specified and on the following:
 - a. Fence Height: As indicated on Drawings.
 - b. Material Group: IA, ASTM F 1043, Schedule 40 steel pipe.

- C. Lightning Protection System: Maximum grounding-resistance value of 25 ohms under normal dry conditions.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chain-link fences and gates.
 - 1. Fence and gate posts, rails, and fittings.
 - 2. Chain-link fabric, reinforcements, and attachments.
 - 3. Accessories: Privacy slats.
 - 4. Gates and hardware.
 - 5. Gate operators, including operating instructions.
 - 6. Motors: Show nameplate data, ratings, characteristics, and mounting arrangements.

- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Show accessories, hardware, gate operation, and operational clearances.
 - 1. Gate Operator: Show locations and details for installing operator components, switches, and controls. Indicate motor size, electrical characteristics, drive arrangement, mounting, and grounding provisions.
 - 2. Wiring Diagrams: For power, signal, and control wiring.

- C. Samples for Initial Selection: For components with factory-applied color finishes.
 - D. Samples for Verification: Prepared on Samples of size indicated below:
 1. Polymer-Coated Components: In 6-inch lengths for components and on full-sized units for accessories.
 - E. Delegated-Design Submittal: For chain-link fences and gate framework indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- 1.4 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For qualified professional engineer.
 - B. Product Certificates: For each type of chain-link fence, and gate, from manufacturer.
 - C. Product Test Reports: For framing strength according to ASTM F 1043.
 - D. Field quality-control reports.
 - E. Warranty: Sample of special warranty.
- 1.5 CLOSEOUT SUBMITTALS
- A. Operation and Maintenance Data: For the following to include in emergency, operation, and maintenance manuals:
 1. Polymer finishes.
 2. Gate hardware.
 3. Gate operator.
- 1.6 QUALITY ASSURANCE
- A. Testing Agency Qualifications: For testing fence grounding. Member company of NETA or an NRTL.
 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
 - 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. Emergency Access Requirements: Comply with requirements of authorities having jurisdiction for gates with automatic gate operators serving as a required means of access.
 - D. Mockups: Build mockups to set quality standards for fabrication and installation.
 1. Include 10-foot length of fence and gate.
 - E. Preinstallation Conference: Conduct conference at Project site.
 1. Inspect and discuss electrical roughing-in, equipment bases, and other preparatory work specified elsewhere.
 2. Review sequence of operation for each type of gate operator.
 3. Review coordination of interlocked equipment specified in this Section and elsewhere.
 4. Review required testing, inspecting, and certifying procedures.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer and installer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Faulty operation of gate operators and controls.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis-of-Design Product: San Diego Fence Company or a prior approved equal.

2.2 CHAIN-LINK FENCE FABRIC

- A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist. Comply with CLFMI Product Manual and with requirements indicated below:
 - 1. Fabric Height: As indicated on Drawings.
 - 2. Steel Wire Fabric: Wire with a diameter of 0.148 inch.
 - a. Mesh Size: 1-3/4 inches.
 - b. Polymer-Coated Fabric: ASTM F 668, Class 2b over zinc-coated steel wire.
 - 1) Color: As selected by Architect from manufacturer's full range, complying with ASTM F 934.
 - 3. Selvage: Twisted top and knuckled bottom.

2.3 FENCE FRAMING

- A. Posts and Rails: Comply with ASTM F 1043 for framing, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 based on the following:
 - 1. Fence Height: As indicated on Drawings.
 - 2. Heavy Industrial Strength: Material Group IA, round steel pipe, Schedule 40.
 - a. Line Post: As required to meet design requirements.
 - b. End, Corner and Pull Post: As required to meet design requirements.
 - 3. Horizontal Framework Members: top and bottom rails complying with ASTM F 1043.
 - a. Top Rail: As required to meet design requirements.
 - 4. Brace Rails: Comply with ASTM F 1043.
 - 5. Metallic Coating for Steel Framing:
 - a. Type A, consisting of not less than minimum 2.0-oz./sq. ft. average zinc coating per ASTM A 123/A 123M or 4.0-oz./sq. ft. zinc coating per ASTM A 653/A 653M.
 - 6. Polymer coating over metallic coating.
 - a. Color: Match chain-link fabric, complying with ASTM F 934.

2.4 SWING GATES

- A. General: Comply with ASTM F 900 for gate posts and single swing gate types.
 - 1. Gate Leaf Width: As indicated.
 - 2. Gate Fabric Height: As indicated.
- B. Pipe and Tubing:
 - 1. Zinc-Coated Steel: Comply with ASTM F 1043 and ASTM F 1083; protective coating and finish to match fence framing.
 - 2. Gate Posts: Round tubular steel.
 - 3. Gate Frames and Bracing: Round tubular steel.
- C. Frame Corner Construction: Welded or assembled with corner fittings.
- D. Hardware:
 - 1. Hinges: 180-degree inward swing.
 - 2. Latches permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.

2.5 HORIZONTAL-SLIDE GATES

- A. General: Comply with ASTM F 1184 for gate posts and single sliding gate types. Provide automated vehicular gates that comply with ASTM F 2200, as indicated on Drawings.
 - 1. Classification: Type I Overhead Slide.
 - a. Gate Leaf Width: As indicated.
 - b. Gate Fabric Height: As indicated.
- B. Pipe and Tubing:
 - 1. Zinc-Coated Steel: Protective coating and finish to match fence framing.
 - 2. Gate Posts: Comply with ASTM F 1184. Provide round tubular steel posts.
 - 3. Gate Frames and Bracing: Round tubular steel.
- C. Frame Corner Construction: Welded.
- D. Hardware:
 - 1. Latches permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.
 - 2. Hangers, roller assemblies, and stops fabricated from galvanized steel.

2.6 FITTINGS

- A. General: Comply with ASTM F 626.
- B. Post Caps: Provide for each post.
 - 1. Provide line post caps with loop to receive top rail.
- C. Rail and Brace Ends: For each gate, corner, pull, and end post.
- D. Rail Fittings: Provide the following:
 - 1. Top Rail Sleeves: Pressed-steel or round-steel tubing not less than 6 inches long.
 - 2. Rail Clamps: Line and corner boulevard clamps for connecting bottom rails in the fence line-to-line posts.
- E. Tension and Brace Bands: Pressed steel.

- F. Truss Rod Assemblies: Steel, hot-dip galvanized after threading rod and turnbuckle or other means of adjustment.
- G. Tie Wires, Clips, and Fasteners: According to ASTM F 626.
 - 1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:
 - a. Hot-Dip Galvanized Steel: 0.106-inch- diameter wire; galvanized coating thickness matching coating thickness of chain-link fence fabric.
- H. Finish:
 - 1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz. /sq. ft. zinc.
 - a. Polymer coating over metallic coating.

2.7 PRIVACY SLATS

- A. Material: PVC, UV-light stabilized, not less than 0.023 inch thick; sized to fit mesh specified for direction indicated.
- B. Color: As selected by Architect from manufacturer's full range.

2.8 GATE OPERATORS

- A. General: Provide factory-assembled automatic operating system designed for gate size, type, weight, and operation frequency. Provide operation control system with characteristics suitable for Project conditions, with remote-control stations, safety devices, and weatherproof enclosures; coordinate electrical requirements with building electrical system.
 - 1. Provide operator designed so motor may be removed without disturbing limit-switch adjustment and without affecting auxiliary emergency operator.
 - 2. Provide operator with UL approval.
 - 3. Provide electronic components with built-in troubleshooting diagnostic feature.
 - 4. Provide unit designed and wired for both right-hand/left-hand opening, permitting universal installation.
- B. Comply with NFPA 70.
- C. UL Standard: Fabricate and label gate operators to comply with UL 325.
- D. Motor Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, within installed environment, with indicated operating sequence, and without exceeding nameplate rating or considering service factor. Comply with NEMA MG 1 and the following:
 - 1. Voltage: 120 V.
 - 2. Horsepower: 3/4.
 - 3. Enclosure: Totally enclosed.
 - 4. Duty: Continuous duty at ambient temperature of 105 deg F and at altitude of 3300 feet above sea level.
 - 5. Service Factor: 1.15 for open dripproof motors; 1.0 for totally enclosed motors.
 - 6. Phase: One.
- E. Gate Operators: Equipment base/pad mounted and as follows:
 - 1. Mechanical Slide Gate Operators:
 - a. Duty: Heavy duty, commercial/industrial.
 - b. Gate Speed: Minimum 60 feet per minute.
 - c. Maximum Gate Weight: 800 lb.
 - d. Frequency of Use: 25 cycles per hour.
 - e. Operating Type: Roller chain, with manual release.

- f. Drive Type: Enclosed worm gear and chain-and-sprocket reducers, roller-chain drive.
- F. Remote Controls: Electric controls separated from gate and motor and drive mechanism, with NEMA ICS 6, Type 1 enclosure for equipment base/pad mounting and with space for additional optional equipment. Provide the following remote-control device(s):
1. Control Station: Momentary-contact, three-button-operated; located remotely from gate. Key switch to lock out open and close buttons.
 - a. Function: Open, stop, and close.
 2. Radio Control: Digital system consisting of code-compatible universal receiver for each gate, located where indicated, with remote antenna with coaxial cable and mounting brackets designed to operate gates. Provide two programmable transmitter(s) with multiple-code capability permitting validating or voiding of not less than 1000 codes per channel configured for the following functions:
 - a. Transmitters: Single-button operated, with open function.
 - b. Channel Settings: Four independent channel settings controlling separate receivers for operating more than one gate from each transmitter.
 3. Vehicle Loop Detector: System including automatic closing timer with adjustable time delay before closing, timer cut-off switch, and loop detector designed to open and close gate hold gate open until traffic clears. Provide electronic detector with adjustable detection patterns, adjustable sensitivity and frequency settings, and panel indicator light designed to detect presence or transit of a vehicle over an embedded loop of wire and to emit a signal activating the gate operator. Provide number of loops consisting of multiple strands of wire, number of turns, loop size, and method of placement at location shown on Drawings, as recommended in writing by detection system manufacturer for function indicated.
 - a. Loop: Wire, in size indicated for field assembly, for saw-cut with epoxy-grouted installation.
 4. Vehicle Presence Detector: System including automatic closing timer with adjustable time delay before closing, timer cut-off switch, and presence detector designed to open and close gate, hold gate open until traffic clears. Provide emitter/receiver detector with adjustable detection zone pattern and sensitivity, designed to detect the presence or transit of a vehicle in gate pathway when infrared beam in zone pattern is interrupted, and to emit a signal activating the gate operator.
- G. Obstruction Detection Devices: Provide each motorized gate with automatic safety sensor(s). Activation of sensor(s) causes operator to immediately function as follows:
1. Action: Reverse gate in both opening and closing cycles and hold until clear of obstruction.
 2. Photoelectric/Infrared Sensor System: Designed to detect an obstruction in gate's path when infrared beam in the zone pattern is interrupted.
- H. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop gate at fully retracted and fully extended positions.
1. Type: Integral fail-safe release, allowing gate to be pushed open without mechanical devices, keys, cranks, or special knowledge.
- I. Operating Features:
1. Digital Microprocessor Control: Electronic programmable means for setting, changing, and adjusting control features with capability for monitoring and auditing gate activity. Provide unit that is isolated from voltage spikes and surges.
 2. System Integration: With controlling circuit board capable of accepting any type of input from external devices.
 3. Automatic Closing Timer: With adjustable time delay before closing and timer cut-off switch.
 4. Open Override Circuit: Designed to override closing commands.

5. Reversal Time Delay: Designed to protect gate system from shock load on reversal in both directions.
6. Maximum Run Timer: Designed to prevent damage to gate system by shutting down system if normal time to open gate is exceeded.
7. Clock Timer: 24-hour programmable for regular events.

J. Accessories:

1. Backup System: Connect gate to backup electrical system.
2. Instructional, Safety, and Warning Labels and Signs: According to UL 325.
3. Equipment Bases/Pads: Cast-in-place or precast concrete, 6 to 12 inches below frost line or detail on Drawings, dimensioned and reinforced according to gate-operator component manufacturer's written instructions and as indicated on Drawings.

2.9 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.
- B. 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. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer, for exterior applications.

2.10 FENCE GROUNDING

- A. Conductors: Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.
 1. Material above Finished Grade: Copper.
 2. Material on or below Finished Grade: Copper.
 3. Bonding Jumpers: Braided copper tape, 1 inch wide, woven of No. 30 AWG bare copper wire, terminated with copper ferrules.
- B. Connectors and Grounding Rods: Comply with UL 467.
 1. Connectors for Below-Grade Use: Exothermic welded type.
 2. Grounding Rods: Copper-clad steel, 5/8 by 96 inches.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for a verified survey of property lines and legal boundaries, site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
 1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 INSTALLATION, GENERAL

- A. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements indicated.
 - 1. Install fencing on established boundary lines inside property line.

3.4 CHAIN-LINK FENCE INSTALLATION

- A. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
- B. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
 - 1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
 - 2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
 - a. Concealed Concrete: Top 2 inches below grade to allow covering with surface material.
- C. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of as indicated on Drawings.
- D. Line Posts: Space line posts uniformly as indicated on Drawings.
- E. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.
 - 1. Locate horizontal braces at midheight of fabric 72 inches or higher, on fences with top rail and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
- F. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.
- G. Bottom Rails: Install and secure to posts with fittings.
- H. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 1 inch between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
- I. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches o.c.
- J. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.
 - 1. Maximum Spacing: Tie fabric to line posts at 12 inches o.c. and to braces at 24 inches o.c.
- K. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

- L. Privacy Slats: Install slats in direction indicated, securely locked in place.
 - 1. Vertically, for privacy factor of 70 to 75.

3.5 GATE INSTALLATION

- A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.6 GATE OPERATOR INSTALLATION

- A. General: Install gate operators according to manufacturer's written instructions, aligned and true to fence line and grade.
- B. Excavation for Equipment Bases/Pads: Hand-excavate holes for bases/pads, in firm, undisturbed soil to dimensions and depths and at locations as required by gate-operator component manufacturer's written instructions and as indicated.
- C. Vehicle Loop Detector System: Cut grooves in pavement and bury and seal wire loop according to manufacturer's written instructions. Connect to equipment operated by detector.
- D. Comply with NFPA 70 and manufacturer's written instructions for grounding of electric-powered motors, controls, and other devices.

3.7 GROUNDING AND BONDING

- A. Fence Grounding: Install at maximum intervals of 1500 feet except as follows:
 - 1. Fences within 100 Feet of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet.
 - a. Gates and Other Fence Openings: Ground fence on each side of opening.
 - 1) Bond metal gates to gate posts.
- B. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a maximum distance of 150 feet on each side of crossing.
- C. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at the grounding location, including the following:
 - 1. Make grounding connections to each barbed wire strand with wire-to-wire connectors designed for this purpose.
 - 2. Make grounding connections to each barbed tape coil with connectors designed for this purpose.
- D. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.
- E. Connections: Make connections to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 - 1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
 - 2. Make connections with clean, bare metal at points of contact.
 - 3. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

- F. Bonding to Lightning Protection System: If fence terminates at lightning-protected building or structure, ground the fence and bond the fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor complying with NFPA 780.

3.8 FIELD QUALITY CONTROL

- A. Grounding-Resistance Testing: Owner will engage a qualified testing agency to perform tests and inspections.
 - 1. Grounding-Resistance Tests: Subject completed grounding system to a megger test at each grounding location. Measure grounding resistance no fewer than two full days after last trace of precipitation, without soil having been moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural grounding resistance. Perform tests by two-point method according to IEEE 81.
 - 2. Excessive Grounding Resistance: If resistance to grounding exceeds specified value, notify Architect promptly. Include recommendations for reducing grounding resistance and a proposal to accomplish recommended work.
 - 3. Report: Prepare test reports certified by a testing agency of grounding resistance at each test location. Include observations of weather and other phenomena that may affect test results.

3.9 ADJUSTING

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Automatic Gate Operator: Energize circuits to electrical equipment and devices. Adjust operators, controls, safety devices, and limit switches.
 - 1. Hydraulic Operator: Purge operating system, adjust pressure and fluid levels, and check for leaks.
 - 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. Lubricate hardware, gate operator, and other moving parts.

3.10 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's personnel to adjust, operate, and maintain chain-link fences and gates.

END OF SECTION

SUPPLEMENTARY SPECIAL PROVISIONS
APPENDICES

APPENDIX A
ENVIRONMENTAL EXEMPTION

DETERMINATION OF
ENVIRONMENTAL EXEMPTION

Pursuant to the California Environmental Quality Act (CEQA) and State CEQA Guidelines

Agency: CITY OF SAN DIEGO

Project No.: 71662

Date: 9/14/06

Action/Permit(s): City Council Approval

Description of Activity: Fire Station 22/Council Approval to allow for the demolition of the existing 2,270 square foot Fire Station 22 and to allow for the construction of a new 6,185, square-foot Fire Station 22 apparatus bay. Construction would occur within the same development footprint as the existing Fire Station 22 which would be enlarged by 3,915 square-feet.

Location of Activity: 1055 Catalina Boulevard within RS-1-F zone and the Peninsula Community Plan area, Council District 2

CHECK BOXES BELOW

- This activity is EXEMPT FROM CEQA pursuant to:
- Section 15061(b) (3) of the State CEQA Guidelines (the activity is not a project as defined in Section 15378).
- This project is EXEMPT FROM CEQA pursuant to State CEQA Guidelines Section checked below:

**ARTICLE 19 of GUIDELINES
CATEGORICAL EXEMPTIONS
(Incomplete list)**

Section	Short Name
<input checked="" type="checkbox"/> 15301	Existing Facilities
<input type="checkbox"/> 15302	Replacement or Reconstruction
<input type="checkbox"/> 15303	New Construction or Conversion of Small Structures
<input type="checkbox"/> 15304	Minor Alterations to Land
<input type="checkbox"/> 15305	Minor Alteration in Land Use
<input type="checkbox"/> 15306	Information Collection
<input type="checkbox"/> 15311	Accessory Structures
<input type="checkbox"/> 15312	Surplus Government Property Sales
<input type="checkbox"/> 15315	Minor Land Divisions
<input type="checkbox"/> 15317	Open Space Contracts or Easements
<input type="checkbox"/> 15319	Annexation of Existing Facilities and Lots for Exempt Facilities
<input type="checkbox"/> 15325	Transfer of Ownership of Interest in Land to Preserve Open Space
<input checked="" type="checkbox"/> 15332	Infill Development Projects

**ARTICLE 18 of GUIDELINES
STATUTORY EXEMPTIONS
(Incomplete list)**

Section	Short Name
<input type="checkbox"/> 15261	Ongoing Project
<input type="checkbox"/> 15262	Feasibility and Planning Studies
<input type="checkbox"/> 15265	Adoption of Coastal Plans and Programs
<input type="checkbox"/> 15268	Ministerial Projects
<input type="checkbox"/> 15269	Emergency Projects
<input type="checkbox"/> Other	

It is hereby certified that the City of San Diego has determined the above activity to be exempt:


Myra Herrmann, Senior Planner
Environmental Analysis Section

Distribution:

Exemption or Project file
Patrioia Grabski, Development Project Manager
Alexandra Corsi, Engineering and Capital Projects

APPENDIX B
FIRE HYDRANT METER PROGRAM

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 1 OF 10	EFFECTIVE DATE October 15, 2002
	SUPERSEDES DI 55.27	DATED April 21, 2000

1. **PURPOSE**

1.1 To establish a Departmental policy and procedure for issuance, proper usage and charges for fire hydrant meters.

2. **AUTHORITY**

- 2.1 All authorities and references shall be current versions and revisions.
- 2.2 San Diego Municipal Code (NC) Chapter VI, Article 7, Sections 67.14 and 67.15
- 2.3 Code of Federal Regulations, Safe Drinking Water Act of 1986
- 2.4 California Code of Regulations, Titles 17 and 22
- 2.5 California State Penal Code, Section 498B.0
- 2.6 State of California Water Code, Section 110, 500-6, and 520-23
- 2.7 Water Department Director

Reference

- 2.8 State of California Guidance Manual for Cross Connection Programs
- 2.9 American Water Works Association Manual M-14, Recommended Practice for Backflow Prevention
- 2.10 American Water Works Association Standards for Water Meters
- 2.11 U.S.C. Foundation for Cross Connection Control and Hydraulic Research Manual

3. **DEFINITIONS**

3.1 **Fire Hydrant Meter:** A portable water meter which is connected to a fire hydrant for the purpose of temporary use. (These meters are sometimes referred to as Construction Meters.)

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3.2 **Temporary Water Use:** Water provided to the customer for no longer than twelve (12) months.

3.3 **Backflow Preventor:** A Reduced Pressure Principal Assembly connected to the outlet side of a Fire Hydrant Meter.

4. **POLICY**

4.1 The Water Department shall collect a deposit from every customer requiring a fire hydrant meter and appurtenances prior to providing the meter and appurtenances (see Section 7.1 regarding the Fees and Deposit Schedule). The deposit is refundable upon the termination of use and return of equipment and appurtenances in good working condition.

4.2 Fire hydrant meters will have a 2 ½" swivel connection between the meter and fire hydrant. The meter shall not be connected to the 4" port on the hydrant. All Fire Hydrant Meters issued shall have a Reduced Pressure Principle Assembly (RP) as part of the installation. Spanner wrenches are the only tool allowed to turn on water at the fire hydrant.

4.3 The use of private hydrant meters on City hydrants is prohibited, with exceptions as noted below. All private fire hydrant meters are to be phased out of the City of San Diego. All customers who wish to continue to use their own fire hydrant meters must adhere to the following conditions:

a. Meters shall meet all City specifications and American Water Works Association (AWWA) standards.

b. Customers currently using private fire hydrant meters in the City of San Diego water system will be allowed to continue using the meter under the following conditions:

1. The customer must submit a current certificate of accuracy and calibration results for private meters and private backflows annually to the City of San Diego, Water Department, Meter Shop.

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2. The meter must be properly identifiable with a clearly labeled serial number on the body of the fire hydrant meter. The serial number shall be plainly stamped on the register lid and the main casing. Serial numbers shall be visible from the top of the meter casing and the numbers shall be stamped on the top of the inlet casing flange.
3. All meters shall be locked to the fire hydrant by the Water Department, Meter Section (see Section 4.7).
4. All meters shall be read by the Water Department, Meter Section (see Section 4.7).
5. All meters shall be relocated by the Water Department, Meter Section (see Section 4.7).
6. These meters shall be tested on the anniversary of the original test date and proof of testing will be submitted to the Water Department, Meter Shop, on a yearly basis. If not tested, the meter will not be allowed for use in the City of San Diego.
7. All private fire hydrant meters shall have backflow devices attached when installed.
8. The customer must maintain and repair their own private meters and private backflows.
9. The customer must provide current test and calibration results to the Water Department, Meter Shop after any repairs.
10. When private meters are damaged beyond repair, these private meters will be replaced by City owned fire hydrant meters.

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11. When a private meter malfunctions, the customer will be notified and the meter will be removed by the City and returned to the customer for repairs. Testing and calibration results shall be given to the City prior to any re-installation.
 12. The register shall be hermetically sealed straight reading and shall be readable from the inlet side. Registration shall be in hundred cubic feet.
 13. The outlet shall have a 2 ½ “National Standards Tested (NST) fire hydrant male coupling.
 14. Private fire hydrant meters shall not be transferable from one contracting company to another (i.e. if a company goes out of business or is bought out by another company).
- 4.4 All fire hydrant meters and appurtenances shall be installed, relocated and removed by the City of San Diego, Water Department. All City owned fire hydrant meters and appurtenances shall be maintained by the City of San Diego, Water Department, Meter Services.
- 4.5 If any fire hydrant meter is used in violation of this Department Instruction, the violation will be reported to the Code Compliance Section for investigation and appropriate action. Any customer using a fire hydrant meter in violation of the requirements set forth above is subject to fines or penalties pursuant to the Municipal Code, Section 67.15 and Section 67.37.
- 4.6 **Conditions and Processes for Issuance of a Fire Hydrant Meter**
- Process for Issuance
- a. Fire hydrant meters shall only be used for the following purposes:
 1. Temporary irrigation purposes not to exceed one year.

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2. Construction and maintenance related activities (see Tab 2).

- b. No customer inside or outside the boundaries of the City of San Diego Water Department shall resell any portion of the water delivered through a fire hydrant by the City of San Diego Water Department.
- c. The City of San Diego allows for the issuance of a temporary fire hydrant meter for a period not to exceed 12 months (365 days). An extension can only be granted in writing from the Water Department Director for up to 90 additional days. A written request for an extension by the consumer must be submitted at least 30 days prior to the 12 month period ending. No extension shall be granted to any customer with a delinquent account with the Water Department. No further extensions shall be granted.
- d. Any customer requesting the issuance of a fire hydrant meter shall file an application with the Meter Section. The customer must complete a "Fire Hydrant Meter Application" (Tab 1) which includes the name of the company, the party responsible for payment, Social Security number and/or California ID, requested location of the meter (a detailed map signifying an exact location), local contact person, local phone number, a contractor's license (or a business license), description of specific water use, duration of use at the site and full name and address of the person responsible for payment.
- e. At the time of the application the customer will pay their fees according to the schedule set forth in the Rate Book of Fees and Charges, located in the City Clerk's Office. All fees must be paid by check, money order or cashiers check, made payable to the City Treasurer. Cash will not be accepted.
- f. No fire hydrant meters shall be furnished or relocated for any customer with a delinquent account with the Water Department.
- g. After the fees have been paid and an account has been created, the

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meter shall be installed within 48 hours (by the second business day). For an additional fee, at overtime rates, meters can be installed within 24 hours (within one business day).

4.7 Relocation of Existing Fire Hydrant Meters

- a. The customer shall call the Fire Hydrant Meter Hotline (herein referred to as "Hotline"), a minimum of 24 hours in advance, to request the relocation of a meter. A fee will be charged to the existing account, which must be current before a work order is generated for the meter's relocation.
- b. The customer will supply in writing the address where the meter is to be relocated (map page, cross street, etc). The customer must update the original Fire Hydrant Meter Application with any changes as it applies to the new location.
- c. Fire hydrant meters shall be read on a monthly basis. While fire hydrant meters and backflow devices are in service, commodity, base fee and damage charges, if applicable, will be billed to the customer on a monthly basis. If the account becomes delinquent, the meter will be removed.

4.8 Disconnection of Fire Hydrant Meter

- a. After ten (10) months a "Notice of Discontinuation of Service" (Tab 3) will be issued to the site and the address of record to notify the customer of the date of discontinuance of service. An extension can only be granted in writing from the Water Department Director for up to 90 additional days (as stated in Section 4.6C) and a copy of the extension shall be forwarded to the Meter Shop Supervisor. If an extension has not been approved, the meter will be removed after twelve (12) months of use.
- b. Upon completion of the project the customer will notify the Meter Services office via the Hotline to request the removal of the fire hydrant meter and appurtenances. A work order will be generated

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for removal of the meter.

- c. Meter Section staff will remove the meter and backflow prevention assembly and return it to the Meter Shop. Once returned to the Meter Shop the meter and backflow will be tested for accuracy and functionality.
- d. Meter Section Staff will contact and notify Customer Services of the final read and any charges resulting from damages to the meter and backflow or its appurtenance. These charges will be added on the customer's final bill and will be sent to the address of record. Any customer who has an outstanding balance will not receive additional meters.
- e. Outstanding balances due may be deducted from deposits and any balances refunded to the customer. Any outstanding balances will be turned over to the City Treasurer for collection. Outstanding balances may also be transferred to any other existing accounts.

5. **EXCEPTIONS**

- 5.1 Any request for exceptions to this policy shall be presented, in writing, to the Customer Support Deputy Director, or his/her designee for consideration.

6. **MOBILE METER**

- 6.1 Mobile meters will be allowed on a case by case basis. All mobile meters will be protected by an approved backflow assembly and the minimum requirement will be a Reduced Pressure Principal Assembly. The two types of Mobile Meters are vehicle mounted and floating meters. Each style of meters has separate guidelines that shall be followed for the customer to retain service and are described below:

- a) **Vehicle Mounted Meters:** Customer applies for and receives a City owned Fire Hydrant Meter from the Meter Shop. The customer mounts the meter on the vehicle and brings it to the Meter Shop for

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inspection. After installation is approved by the Meter Shop the vehicle and meter shall be brought to the Meter Shop on a monthly basis for meter reading and on a quarterly basis for testing of the backflow assembly. Meters mounted at the owner's expense shall have the one year contract expiration waived and shall have meter or backflow changed if either fails.

b) **Floating Meters:** Floating Meters are meters that are not mounted to a vehicle. **(Note: All floating meters shall have an approved backflow assembly attached.)** The customer shall submit an application and a letter explaining the need for a floating meter to the Meter Shop. The Fire Hydrant Meter Administrator, after a thorough review of the needs of the customer, (i.e. number of jobsites per day, City contract work, lack of mounting area on work vehicle, etc.), may issue a floating meter. At the time of issue, it will be necessary for the customer to complete and sign the "Floating Fire Hydrant Meter Agreement" which states the following:

- 1) The meter will be brought to the Meter Shop at 2797 Caminito Chollas, San Diego on the third week of each month for the monthly read by Meter Shop personnel.
- 2) Every other month the meter will be read and the backflow will be tested. This date will be determined by the start date of the agreement.

If any of the conditions stated above are not met the Meter Shop has the right to cancel the contract for floating meter use and close the account associated with the meter. The Meter Shop will also exercise the right to refuse the issuance of another floating meter to the company in question.

Any Fire Hydrant Meter using reclaimed water shall not be allowed use again with any potable water supply. The customer shall incur the cost of replacing the meter and backflow device in this instance.

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7. **FEE AND DEPOSIT SCHEDULES**

7.1 **Fees and Deposit Schedules:** The fees and deposits, as listed in the Rate Book of Fees and Charges, on file with the Office of the City Clerk, are based on actual reimbursement of costs of services performed, equipment and materials. These deposits and fees will be amended, as needed, based on actual costs. Deposits, will be refunded at the end of the use of the fire hydrant meter, upon return of equipment in good working condition and all outstanding balances on account are paid. Deposits can also be used to cover outstanding balances.

All fees for equipment, installation, testing, relocation and other costs related to this program are subject to change without prior notification. The Mayor and Council will be notified of any future changes.

8. **UNAUTHORIZED USE OF WATER FROM A HYDRANT**

- 8.1 Use of water from any fire hydrant without a properly issued and installed fire hydrant meter is theft of City property. Customers who use water for unauthorized purposes or without a City of San Diego issued meter will be prosecuted.
- 8.2 If any unauthorized connection, disconnection or relocation of a fire hydrant meter, or other connection device is made by anyone other than authorized Water Department personnel, the person making the connection will be prosecuted for a violation of San Diego Municipal Code, Section 67.15. In the case of a second offense, the customer's fire hydrant meter shall be confiscated and/or the deposit will be forfeited.
- 8.3 Unauthorized water use shall be billed to the responsible party. Water use charges shall be based on meter readings, or estimates when meter readings are not available.
- 8.4 In case of unauthorized water use, the customer shall be billed for all applicable charges as if proper authorization for the water use had been obtained, including but not limited to bi-monthly service charges, installation charges and removal charges.

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- 8.5 If damage occurs to Water Department property (i.e. fire hydrant meter, backflow, various appurtenances), the cost of repairs or replacements will be charged to the customer of record (applicant).

**Larry Gardner
Water Department Director**

- Tab: 1. Fire Hydrant Meter Application
2. Construction & Maintenance Related Activities With No Return To Sewer
3. Notice of Discontinuation of Service

APPENDIX

Administering Division: Customer Support Division

Subject Index: Construction Meters
Fire Hydrant
Fire Hydrant Meter Program
Meters, Floating or Vehicle Mounted
Mobile Meter
Program, Fire Hydrant Meter

Distribution: DI Manual Holders



Application for Fire Hydrant Meter (EXHIBIT A)

(For Office Use Only)

NS REQ	FAC#
DATE	BY

METER SHOP (619) 527-7449

Meter Information

Application Date	Requested Install Date:
------------------	-------------------------

Fire Hydrant Location: (Attach Detailed Map//Thomas Bros. Map Location or Construction drawing.) Zip:	T.B.	G.B. (CITY USE)
Specific Use of Water:		
Any Return to Sewer or Storm Drain, If so, explain:		
Estimated Duration of Meter Use:		Check Box if Reclaimed Water

Company Information

Company Name:			
Mailing Address:			
City:	State:	Zip:	Phone: ()
*Business license#		*Contractor license#	
A Copy of the Contractor's license OR Business License is required at the time of meter issuance.			
Name and Title of Billing Agent: <small>(PERSON IN ACCOUNTS PAYABLE)</small>			Phone: ()
Site Contact Name and Title:			Phone: ()
Responsible Party Name:			Title:
Cal ID#			Phone: ()
Signature:		Date:	
Guarantees Payment of all Charges Resulting from the use of this Meter. Insures that employees of this Organization understand the proper use of Fire Hydrant Meter			

Fire Hydrant Meter Removal Request	Requested Removal Date:
Provide Current Meter Location if Different from Above:	
Signature:	Title: Date:
Phone: ()	Pager: ()

City Meter	Private Meter
Contract Acct #:	Deposit Amount: \$ 936.00 Fees Amount: \$ 62.00
Meter Serial #	Meter Size: 05 Meter Make and Style: 6-7
Backflow #	Backflow Size: Backflow Make and Style:
Name: e-Bidding Point Loma Fire Station No. 22 Appendix B - Fire Hydrant Meter Program (Rev. July 2015)	Signature: Date: 1000 Page

WATER USES WITHOUT ANTICIPATED CHARGES FOR RETURN TO SEWER

Auto Detailing
Backfilling
Combination Cleaners (Vactors)
Compaction
Concrete Cutters
Construction Trailers
Cross Connection Testing
Dust Control
Flushing Water Mains
Hydro Blasting
Hydro Seeing
Irrigation (for establishing irrigation only; not continuing irrigation)
Mixing Concrete
Mobile Car Washing
Special Events
Street Sweeping
Water Tanks
Water Trucks
Window Washing

Note:

1. If there is any return to sewer or storm drain, then sewer and/or storm drain fees will be charges.

Date

Name of Responsible Party
Company Name and Address
Account Number: _____

Subject: Discontinuation of Fire Hydrant Meter Service

Dear Water Department Customer:

The authorization for use of Fire Hydrant Meter # _____, located at *(Meter Location Address)* ends in 60 days and will be removed on or after *(Date Authorization Expires)*. Extension requests for an additional 90 days must be submitted in writing for consideration 30 days prior to the discontinuation date. If you require an extension, please contact the Water Department, or mail your request for an extension to:

City of San Diego
Water Department
Attention: Meter Services
2797 Caminito Chollas
San Diego, CA 92105-5097

Should you have any questions regarding this matter, please call the Fire Hydrant Hotline at (619) _____ - _____.

Sincerely,

Water Department

APPENDIX C
MATERIALS TYPICALLY ACCEPTED BY THE
CERTIFICATE OF COMPLIANCE

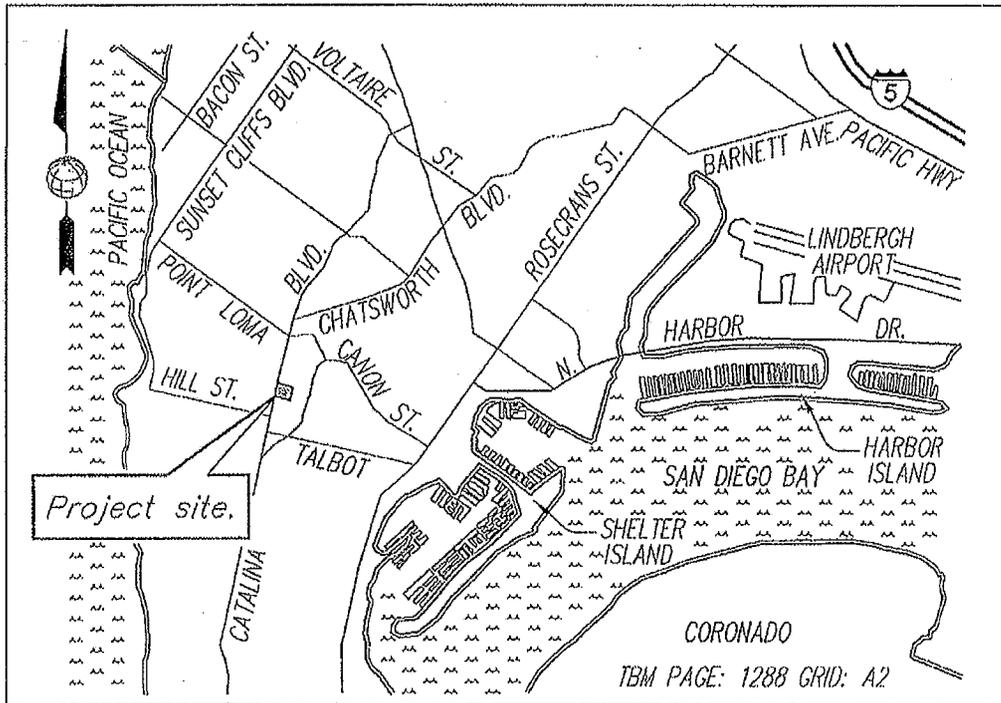
Materials Typically Accepted by Certificate of Compliance

1. Soil amendment
2. Fiber mulch
3. PVC or PE pipe up to 16 inch diameter
4. Stabilizing emulsion
5. Lime
6. Preformed elastomeric joint seal
7. Plain and fabric reinforced elastomeric bearing pads
8. Steel reinforced elastomeric bearing pads
9. Waterstops (Special Condition)
10. Epoxy coated bar reinforcement
11. Plain and reinforcing steel
12. Structural steel
13. Structural timber and lumber
14. Treated timber and lumber
15. Lumber and timber
16. Aluminum pipe and aluminum pipe arch
17. Corrugated steel pipe and corrugated steel pipe arch
18. Structural metal plate pipe arches and pipe arches
19. Perforated steel pipe
20. Aluminum underdrain pipe
21. Aluminum or steel entrance tapers, pipe downdrains, reducers, coupling bands and slip joints
22. Metal target plates
23. Paint (traffic striping)
24. Conductors
25. Painting of electrical equipment
26. Electrical components
27. Engineering fabric
28. Portland Cement
29. PCC admixtures
30. Minor concrete, asphalt
31. Asphalt (oil)
32. Liquid asphalt emulsion
33. Epoxy

APPENDIX D
LOCATION MAP

VICINITY MAP

NOT TO SCALE



APPENDIX E
OWNER'S PROJECT REQUIREMENT
CITY OF SAN DIEGO FIRE STATION #22 - FEBRUARY 10, 2014
(ENHANCED COMMISSIONING REPORT)

Owner's Project Requirement City of San Diego Fire Station #22

February 10, 2014

DEC Engineers, Inc.

7360 Carroll Rd Suite 100
San Diego, CA 92121



Contents

Introduction	2
Owner and User Requirements	3
Environmental and Sustainability Goals	4
Indoor Environmental Quality Requirements	5
Equipment and System Expectations	6
Building Occupant and O&M Personnel Requirements	7

Introduction

In accordance with sustainability goals of the City of San Diego, Fire Station No. 22 shall be designed and built to achieve a minimum Silver rating under the United States Green Building Council's Leadership in Energy and Environmental Design for Green Building Design and Construction 2009 Edition (LEED-NC 2009)

To convey project specific goals and requirements to the design team an Owner's Project Requirements (OPR) document is developed by the owner in collaboration with the commissioning authority, project team, facility staff, and building users. This document may be updated by the owner as design and construction progress.

In addition to being a LEED-NC 2009 requirement, this document serves as the foundation on which the design team develops the Basis of Design document. In addition, the OPR provides a baseline for evaluating those aspects of the project most important to the owner such as energy, sustainability, indoor environmental quality, and maintainability.

Owner and User Requirements

Project Description

Fire Station No. 22 will be a one-story structure encompassing approximately 6,185 square feet and located in 1022 Catalina Boulevard, San Diego CA. Fire Station No. 22 replaces an existing and outdated fire station in a residential site. It will contain 6 dorm rooms, a kitchen/dining room, day room, watch room, exercise room, lounge and two bays for apparatus.

The building will also include a carport with a photo-voltaic panel roof in adjacent parking lot.

Environmental and Sustainability Goals

The City of San Diego is dedicated to sustainable building practices and requires all new construction projects and major renovations to demonstrate energy efficiency, green building, and sustainable measures. As part of this commitment, this project is pursuing Silver certification under the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Green Building Design and Construction 2009 Edition rating system. In addition to a LEED Silver certification, the project will comply with the City of San Diego Sustainable Building Policy (900-14) and CalGreen Standards.

Energy Efficiency Goals

Designing energy efficiency into new buildings is important to the City of San Diego not only to lower annual operating costs but to reduce the City's impact upon the environment. At a minimum the building is required to exceed California Energy Code Title 24 efficiency standards by 15%.

The following goals are outlined in the Fire Station and Facilities Design and Construction Standard, dated 10/23/2013:

- Natural daylight will be provided in hallways, restrooms, common areas and apparatus floor.
- Lighting fixtures will be equipped with timed motion sensors with temporary override capability.
- Exterior lighting shall be timer controlled with energy efficient fixtures, controlled by photocell in series with a switching ability.
- Windows shall have dual paned, high performance, low-E4 glass with weather-tight frames, sashes and seals.
- Central air conditioning and forced air heating shall be provided in living areas as required to maintain 68 to 72 degrees.
- Provide low maintenance, drought tolerant landscaping with high-efficiency irrigation systems and automatic timers.

Indoor Environmental Quality Requirements

Area	Use	Occupancy Schedule	Space Environmental Requirements	Desired Adjustability of Systems	After Hours Use
Watch Room/ Reception	2 works stations & place to meet visitors	24/7			
Apparatus Bays	House 1 pumper, 1 ladder truck	24/7	Passive & positive ventilation w/ exhaust extraction system, some lighting on at all times, automatic lights when alert signals.	Yes	N/A
Wash Room	To wash medical equipment, household mop (Note: SDFD Equip. tends to refer to hoses).	After returning from incident			N/A
Work Room	Repair Equipment	24/7			
Day Room Bullpen	Place for crew to watch TV/movies/ training		Ability to darken room		
Electrical/ Mechanical Room	Electrical, mechanical, data and equipment	24/7			
Locker Room	Store Fire-fighting turn-out gears	24/7	Vented to the exterior, passive & positive ventilation		N/A
Weight Room	Exercise and workout space	24/7	HVAC		
Comm. Room	TV, Cable, Data, Phone, Alerting System				

Area	Use	Occupancy Schedule	Space Environmental Requirements	Desired Adjustability of Systems	After Hours Use
Dorms	Sleeping rooms w/ personal storage lockers and desk	24/7	Ability to darken room and higher acoustical requirements, task lighting at bed and desk	Yes	
Kitchen	Store, prepare, and serve meals	24/7	Range hood		
Dining	Eat meals	24/7	Open to Kitchen		
Bathrooms	Private for captains and chiefs, Male/Female for fire fighters	24/7	Water saving fixtures (Low Flow)	Adjustable Hot/Cold water faucets. (Not single push down types)	

Equipment and System Expectations

- Generator
- Photovoltaic system
- Irrigation
- Fire Alarm System
- Station alerting
- Refer to current San Diego Fire-Rescue Department. Fire station & Facilities & Construction standards for more detail.

Building Occupant and O&M Personnel Requirements

Prior to sign-off and acceptance of the facility, Final walk-thru with the Station Captain(s), Facilities Maintenance Officer, Logistics-Facilities staff will be provided and oral presentation and written instructions shall be provided as part of the O&M facility package.

[Rest of Page Intentionally Left Blank]

APPENDIX F
SAMPLE OF PUBLIC NOTICES



CONSTRUCTION NOTICE

PROJECT NAME

Trenching on your street is complete.

What you need to know:

- Pipe installation on your street is complete and construction crews are now installing new pipeline for this project at another location.
- You may see temporary trench plates or trench caps for some time –even after construction activities have concluded on your street.

Street resurfacing:

- Your Streets will be resurfaced once the entire pipeline project is complete.
- Concrete streets will not be resurfaced curb to curb; only the trench will be backfilled.
- Street resurfacing may be delayed due to the City's slurry seal moratorium.

Estimated resurfacing completion on your street:

(Insert Date-Month and Year)

For questions related to this work

Call: (619) 533-4207

Email: engineering@sandiego.gov

Visit: sandiego.gov/CIP



This information is available in alternative formats upon request.



ATTACHMENT F
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CERTIFICATIONS AND FORMS

Instruction to Bidders, Section 1 - 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 a 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 whose subcontracts are greater than \$50,000 in value has completed a Pledge of Compliance attesting under penalty of perjury of having complied with City of San Diego Municipal Code § 22.3004.

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:

POINT LOMA FIRE STATION NO. 22

(Name of Project)

as particularly described in said contract and identified as Bid No. **K-16-5414-DBB-3**; SAP No. (WBS/IO/CC) **S-007867**; 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 _____, _____.

_____ Contractor

by

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

BID ITEMS

*** PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY ***
TO BE SUBMITTED IN ELECTRONIC FORMAT ONLY
SEE INSTRUCTIONS TO BIDDERS, FOR FURTHER INFORMATION

Item	Quantity	Unit	Payment Reference	NAICS	Description	Unit Price	Extension
BASE BID							
PHASE 1 AWARD ITEMS (1-8)							
1	1	LS	Tech. Spec/ Plans	236220	Construction of Temporary Fire Station No. 22 and Related Site Improvements at 1055 Catalina Blvd, San Diego, CA 92107	 	\$
2	1	LS	701-13.9.5	237990	WPCP - Development - For Temporary Fire Station Best Management Practices as Required by the City of San Diego Land Development Manual Storm Standards of March 24, 2008 Report & Water Quality Technical Report dated May 18, 2011 per Contract Documents	 	\$
3	1	LS	701-13.9.5	237990	WPCP - Implementation - For Temporary Fire Station	 	\$
4	1	AL	7-5.3	236220	Building Permits for Temporary Fire Station: including City of San Diego, Sheet C4 fees, Water & Sewer Capacities and Connection Fees (Reimbursement). Contractor to Include in Project Lump Sum Bid Cost for Mechanical, Plumbing and Electrical Permits. Type I	 	\$10,000.00
5	1	LS	Tech. Spec/ Plans	238210	SDG&E Service Fee, Dry Utilities Connections, Pack Bell, AT&T and Time Warner - Temporary Fire Station	 	\$
6	1	LS	2-1.4	524126	Bond (Payment and Performance) - Temporary Fire Station	 	\$
7	1	LS	Tech. Spec/ Plans	236220	FF & E - Temporary Fire Station	 	\$
8	1	AL	9-3.5		Field Orders - Temporary Fire Station - Type II	 	\$30,000.00

Item	Quantity	Unit	Payment Reference	NAICS	Description	Unit Price	Extension
PHASE 2 AWARD ITEMS (9-17)							
9	1	LS	Tech. Spec/ Plans	236220	Construction of Permanent Fire Station No. 22 and Related Site Improvements, including but not limited to Photovoltaic Solar Panels at Carport Roof Includes Installation and demolition of existing Fire Station at 1055 Catalina Blvd, San Diego, CA 92107.		\$
10	1	LS	701-13.9.5	237990	WPCP - Development - For Permanent Fire Station Best Management Practices as Required by the City of San Diego Land Development Manual Storm Standards of March 24, 2008 Report & Water Quality Technical Report dated May 18, 2011 per Contract Documents		\$
11	1	LS	701-13.9.5	237990	WPCP - Implementation - For Permanent Fire Station		\$
12	1	AL	7-5.3	236220	Building Permits for Permanent Fire Station for any additional permits. Type I		\$10,000.00
13	1	LS	Tech. Spec/ Plans	238210	SDG&E Service Fee, Dry Utilities Connections, Pack Bell, AT&T and Time Warner - Permanent Fire Station		\$
14	1	AL	9-3.5	-	Field Orders - Permanent Fire Station -Type II		\$200,000.00
15	1	LS	2-1.4	524126	Bond (Payment and Performance) - Permanent Fire Station		\$
16	1	LS	Tech. Spec/ Plans	236220	FF & E- Permanent Fire Station		\$
17	1	LS	Tech. Spec/ Plans	238990	Remediation of Possible Contaminated Unusable Soil (to Include Preparation of Hazardous Waste Management Plan and Reporting per 'Whitebook' Section 803-16a as Determined by GEOCON Site Assessment Report dated July 2000)		\$
TOTAL BASE BID:							\$

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	CONSTRUCTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT	MBE, WBE, DBE, DVBE, OBE, ELBE, SLBE, SDB, WoSB, HUBZone, OR SDVOSB	WHERE CERTIFIED 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	MATERIALS OR SUPPLIES	DOLLAR VALUE OF MATERIAL OR SUPPLIES (MUST BE FILLED OUT)	SUPPLIER (Yes/No)	MANUFACTURER (Yes/No)	MBE, WBE, DBE, DVBE, OBE, ELBE, SLBE, SDB, WoSB, HUBZone, OR SDVOSB	WHERE CERTIFIED
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____						
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____						

① As appropriate, Bidder shall identify Vendor/Supplier as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

Certified Minority Business Enterprise	MBE	Certified Woman Business Enterprise	WBE
Certified Disadvantaged Business Enterprise	DBE	Certified Disabled Veteran Business Enterprise	DVBE
Other Business Enterprise	OBE	Certified Emerging Local Business Enterprise	ELBE
Certified Small Local Business Enterprise	SLBE	Small Disadvantaged Business	SDB
Woman-Owned Small Business	WoSB	HUBZone Business	HUBZone
Service-Disabled Veteran Owned Small Business	SDVOSB		

② As appropriate, Bidder shall indicate if Vendor/Supplier is certified by:

City of San Diego	CITY	State of California Department of Transportation	CALTRANS
California Public Utilities Commission	CPUC		
State of California's Department of General Services	CADoGS	City of Los Angeles	LA
State of California	CA	U.S. Small Business Administration	SBA

The Bidder will not receive any subcontracting participation percentages if the Bidder fails to submit the required proof of certification.

SUBCONTRACTORS ADDITIVE/DEDUCTIVE ALTERNATE (USE ONLY WHEN ADDITIVE ALTERNATES ARE REQUIRED)

***** PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY ***
 TO BE SUBMITTED IN ELECTRONIC FORMAT ONLY
 SEE INSTRUCTIONS TO BIDDERS, FOR FURTHER INFORMATION**

ADDITIVE/ DEDUCTIVE ALTERNATE	NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONSTRUCTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT	MBE, WBE, DBE, DVBE, OBE, ELBE, SLBE, SDB, WoSB, HUBZone, OR SDVOSB	WHERE CERTIFIED	CHECK IF JOINT VENTURE PARTNERSHIP
	Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							
	Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

Certified Minority Business Enterprise	MBE	Certified Woman Business Enterprise	WBE
Certified Disadvantaged Business Enterprise	DBE	Certified Disabled Veteran Business Enterprise	DVBE
Other Business Enterprise	OBE	Certified Emerging Local Business Enterprise	ELBE
Certified Small Local Business Enterprise	SLBE	Small Disadvantaged Business	SDB
Woman-Owned Small Business	WoSB	HUBZone Business	HUBZone
Service-Disabled Veteran Owned Small Business	SDVOSB		

② As appropriate, Bidder shall indicate if Subcontractor is certified by:

City of San Diego	CITY	State of California Department of Transportation	CALTRANS
California Public Utilities Commission	CPUC		
State of California's Department of General Services	CADoGS	City of Los Angeles	LA
State of California	CA	U.S. Small Business Administration	SBA

The Bidder will not receive any subcontracting participation percentages if the Bidder fails to submit the required proof of certification.

ELECTRONICALLY SUBMITTED FORMS

THE FOLLOWING FORMS MUST BE SUBMITTED IN PDF FORMAT WITH BID SUBMISSION

The following forms are to be completed by the bidder and submitted (uploaded) electronically with the bid in PlanetBids.

- A. BID BOND – See Instructions to Bidders, Bidders
Guarantee of Good Faith (Bid Security) for further
instructions**
- B. CONTRACTOR’S CERTIFICATION OF PENDING
ACTIONS**
- C. EQUAL BENEFITS ORDINANCE - CERTIFICATION
OF COMPLIANCE**

**Bids will not be accepted until ALL forms are submitted
as part of the bid submittal**

BID BOND

**See Instructions to Bidders, Bidder Guarantee of Good Faith
(Bid Security)**

KNOW ALL MEN BY THESE PRESENTS,

That EC Constructors, Inc. as Principal, and
Hartford Fire Insurance Company as Surety, are held and firmly bound unto The City of San Diego hereinafter called "OWNER," in the sum of **10% OF THE TOTAL BID AMOUNT** for the payment of which sum, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, said Principal has submitted a Bid to said OWNER to perform the WORK required under the bidding schedule(s) of the OWNER's Contract Documents entitled

Point Loma Fire Station No. 22, K-16-5414-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 23rd day of November, 20 15

EC Constructors, Inc. (SEAL)
(Principal)

Hartford Fire Insurance Company (SEAL)
(Surety)

By: Sherri L. Summers
(Signature)
Sherri L. Summers, CEO

By: Charlotte Aquino
(Signature)
Charlotte Aquino, Attorney-In-Fact

(SEAL AND NOTARIAL ACKNOWLEDGEMENT OF SURETY)

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT Civil Code § 1189

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

STATE OF CALIFORNIA

County of San Diego

On NOV 23 2015 before me, Lilia Robinson, Notary Public,
Date Insert Name of Notary exactly as it appears on the official seal

personally appeared Charlotte Aquino
Name(s) of Signer(s)



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

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

Witness my hand and official seal.

Signature [Handwritten Signature]
Signature of Notary Public Lilia Robinson

Place Notary Seal Above

OPTIONAL

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

Description of Attached Document

Title or Type of Document: _____

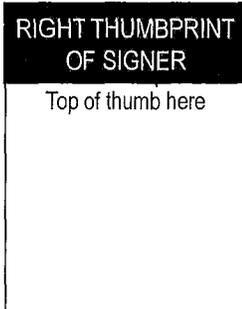
Document Date: _____ Number of Pages: _____

Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____

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



Signer is Representing: _____

Signer's Name: _____

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



Signer is Representing: _____

POWER OF ATTORNEY

Direct Inquiries/Claims to:

THE HARTFORD
BOND, T-4
One Hartford Plaza
Hartford, Connecticut 06155

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

KNOW ALL PERSONS BY THESE PRESENTS THAT:

Agency Code: 72-160200

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

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

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

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

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



Wesley W. Cowling

Wesley W. Cowling, Assistant Secretary

M. Ross Fisher

M. Ross Fisher, Vice President

STATE OF CONNECTICUT }
COUNTY OF HARTFORD } ss. Hartford

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



CERTIFICATE

Kathleen T. Maynard
Kathleen T. Maynard
Notary Public
My Commission Expires July 31, 2016

I, the undersigned, Vice President of the Companies, DO HEREBY CERTIFY that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which is still in full force effective as of November 23, 2015
Signed and sealed at the City of Hartford.



Gary W. Stumper

Gary W. Stumper, Vice President

CONTRACTOR'S CERTIFICATION OF PENDING ACTIONS

As part of its bid or proposal (Non-Price Proposal in the case of Design-Build contracts), the Bidder shall provide to the City a list of all instances within the past 10 years where a complaint was filed or pending against the Bidder in a legal or administrative proceeding alleging that Bidder discriminated against its employees, subcontractors, vendors or suppliers, and a description of the status or resolution of that complaint, including any remedial action taken.

CHECK ONE BOX ONLY.

- The undersigned certifies that within the past 10 years the Bidder has NOT been the subject of a complaint or pending action in a legal administrative proceeding alleging that Bidder discriminated against its employees, subcontractors, vendors or suppliers.
- The undersigned certifies that within the past 10 years the Bidder has been the subject of a complaint or pending action in a legal administrative proceeding alleging that Bidder discriminated against its employees, subcontractors, vendors or suppliers. A description of the status or resolution of that complaint, including any remedial action taken and the applicable dates is as follows:

DATE OF CLAIM	LOCATION	DESCRIPTION OF CLAIM	LITIGATION (Y/N)	STATUS	RESOLUTION/REMEDIAL ACTION TAKEN

Contractor Name: EC Constructors, Inc.

Certified By Sherri L. Summers Name Title CEO

Sherri L. Summers Signature Date 11-24-15

USE ADDITIONAL FORMS AS NECESSARY

**EQUAL BENEFITS ORDINANCE
CERTIFICATION OF COMPLIANCE**



For additional information, contact:
CITY OF SAN DIEGO
EQUAL BENEFITS PROGRAM
 202 C Street, MS 9A, San Diego, CA 92101
 Phone (619) 533-3948 Fax (619) 533-3220

COMPANY INFORMATION

Company Name: EC Constructors, Inc.	Contact Name: Jim Summers
Company Address: 9834 River Street, Lakeside, CA 92040	Contact Phone: (619) 440-7181
	Contact Email: jim@ecconstructors.com

CONTRACT INFORMATION

Contract Title: Point Loma Fire Station No. 22	Start Date: 1/1/16
Contract Number (if no number, state location): K-16-5414-DBB-3	End Date: 9/8/17

SUMMARY OF EQUAL BENEFITS ORDINANCE REQUIREMENTS

The Equal Benefits Ordinance [EBO] requires the City to enter into contracts only with contractors who certify they will provide and maintain equal benefits as defined in SDMC §22.4302 for the duration of the contract. To comply:

- Contractor shall offer equal benefits to employees with spouses and employees with domestic partners.
 - Benefits include health, dental, vision insurance; pension/401(k) plans; bereavement, family, parental leave; discounts, child care; travel/relocation expenses; employee assistance programs; credit union membership; or any other benefit.
 - Any benefit not offer an employee with a spouse, is not required to be offered to an employee with a domestic partner.
- Contractor shall post notice of firm’s equal benefits policy in the workplace and notify employees at time of hire and during open enrollment periods.
- Contractor shall allow City access to records, when requested, to confirm compliance with EBO requirements.
- Contractor shall submit *EBO Certification of Compliance*, signed under penalty of perjury, prior to award of contract.

NOTE: This summary is provided for convenience. Full text of the EBO and Rules Implementing the EBO are available at www.sandiego.gov/administration.

CONTRACTOR EQUAL BENEFITS ORDINANCE CERTIFICATION

Please indicate your firm’s compliance status with the EBO. The City may request supporting documentation.

- I affirm **compliance** with the EBO because my firm (*contractor must select one reason*):
- Provides equal benefits to spouses and domestic partners.
 - Provides no benefits to spouses or domestic partners.
 - Has no employees.
 - Has collective bargaining agreement(s) in place prior to January 1, 2011, that has not been renewed or expired.
- I request the City’s approval to pay affected employees a cash equivalent in lieu of equal benefits and verify my firm made a reasonable effort but is not able to provide equal benefits upon contract award. I agree to notify employees of the availability of a cash equivalent for benefits available to spouses but not domestic partners and to continue to make every reasonable effort to extend all available benefits to domestic partners.

It is unlawful for any contractor to knowingly submit any false information to the City regarding equal benefits or cash equivalent associated with the execution, award, amendment, or administration of any contract. [San Diego Municipal Code §22.4307(a)]

Under penalty of perjury under laws of the State of California, I certify the above information is true and correct. I further certify that my firm understands the requirements of the Equal Benefits Ordinance and will provide and maintain equal benefits for the duration of the contract or pay a cash equivalent if authorized by the City.

Sherri L. Summers, CEO

Sherri L. Summers

11-24-15

Name/Title of Signatory

Signature

Date

FOR OFFICIAL CITY USE ONLY

Receipt Date: _____ EBO Analyst: _____ Approved Not Approved – Reason: _____

(Rev 02/15/2011)

Bid Results for Project Point Loma Fire Station No. 22 (K-16-5414-DBB-3)
 Issued on 10/30/2015
 Bid Due on December 23, 2015 2:00 PM (Pacific)
 Exported on 12/28/2015

VendorID	Company Name	Address	City	State	ZipCode	Country	Contact	Phone	Fax	Email	Vendor Type
302291	EC Constructors Inc.	9834 River Street	Lakeside		92040	United States	James J. Summers	619-440-7181	619-440-7180	jlm@econconstructors.com	CAU,FEM,PQUAL,CADIR,WBE,WOSB,Local

Responsee	Responsee Title	Responsee Phone	Responsee Email
James J. Summers	President	619-440-7181	jlm@econconstructors.com

Bid Format	Submitted Date	Delivery Method	Responsive	Status	Confirmation #	Ranking
Electronic	12/23/2015 13:56			Submitted	68261	0

Attachments		
File Title	File Name	File Type
Contractors's Certificate of Pending Action	Pending Actions.pdf	General Attachments
Equal Benefits Ordinance Certificate of Compliance	Equal Benefits Ordinance.pdf	General Attachments
Bid Bond	Bid Bond.pdf	Bid Bond

Line Items							
Item Num	Section	Item Code	Description	Unit of Measure	Quantity	Unit Price	Line Total
1	Main Bid		Construction of Temporary Fire Station No. 22 and Related S	LS	1	\$772,937.00	\$772,937.00
2	Main Bid		WPCP - Development - For Temporary Fire Station				
		1	Best Management Practices as Required by the City of San Diego Land Development Manual Storm Standards of March 24, 2008 Report & Water Quality Technical Report dated May 18, 2011 per Contract Documents	LS	1	\$1,604.00	\$1,604.00
3	Main Bid		WPCP - Implementation - For Temporary Fire Station	LS	1	\$8,792.00	\$8,792.00
4	Main Bid		Building Permits for Temporary Fire Station; including City of	AL	1	\$10,000.00	\$10,000.00
5	Main Bid		SDG&E Service Fee, Dry Utilities Connections, Pack				
		1	Bell, AT&T and Time Warner - Temporary Fire Station - Type I	AL	1	\$7,000.00	\$7,000.00
6	Main Bid		Bond (Payment and Performance) - Temporary Fire Station	LS	1	\$19,913.00	\$19,913.00
7	Main Bid		FF & E -Temporary Fire Station - Type I	AL	1	\$10,000.00	\$10,000.00
8	Main Bid		Field Orders - Temporary Fire Station - Type II	AL	1	\$30,000.00	\$30,000.00
9	Main Bid		Construction of Permanent Fire Station No. 22 and Related S	LS	1	\$4,477,585.00	\$4,477,585.00
10	Main Bid		WPCP - Development - For Permanent Fire Station				
		1	Best Management Practices as Required by the City of San Diego Land Development Manual Storm Standards of March 24, 2008 Report & Water Quality Technical Report dated May 18, 2011 per Contract Documents	LS	1	\$1,605.00	\$1,605.00
11	Main Bid		WPCP - Implementation - For Permanent Fire Station	LS	1	\$20,000.00	\$20,000.00
12	Main Bid		Building Permits for Permanent Fire Station for Any Addition	AL	1	\$10,000.00	\$10,000.00
13	Main Bid		SDG&E Service Fee, Dry Utilities Connections, Pack				
		1	Bell, AT&T and Time Warner - Permanent Fire Station - Type I	AL	1	\$30,000.00	\$30,000.00

14	Main Bid		Field Orders - Permanent Fire Station -Type II	AL		1	\$200,000.00	\$200,000.00
15	Main Bid		Bond (Payment and Performance) - Permanent Fire Station	LS		1	\$42,314.00	\$42,314.00
16	Main Bid		FF & E- Permanent Fire Station - Type I	AL		1	\$80,000.00	\$80,000.00
17	Main Bid		Remediation of Possible Contaminated Unusable Soil - Type	AL		1	\$20,000.00	\$20,000.00
							Subtotal	\$5,741,750.00
							Total	\$5,741,750.00

Subcontractors									
Name	Description	License Num	Amount	Type	Address	City	State	ZipCode	Country
William A. Steen & Associates	Survey	RCE 18136	\$14,640.00	ELBE	8580 La Mesa Blvd., Suite 102	La Mesa		91942	United States
Pro Spectra Contract Flooring	Flooring	740392	\$13,850.00		8320 Camino Santa Fe	San Diego		92121	United States
Kirk Paving, Inc.	Asphalt	749206	\$33,400.00	PQUAL,SLBE,CADIR	8722 Winter Gardens Blvd.	Lakeside		92040	United States
Construction Hardware	Doors & Hardware	515824	\$52,160.00		PO Box 2587	Pomona		91769	United States
New Star International	Casework	969575	\$104,300.00		807 E. Orange Ave	Anahelm		92801	United States
MODULAR SPACE CORPORATION	Coach	763309	\$134,038.00		1200 SWEDESFORD RD	BERWYN		19312	United States
Bay City Equipment Industries, Inc.	Generators	909519	\$67,763.00	CAU,MALE,CADIR	13625 Danielson St.	Poway		92064	United States
Service Electrical Systems	Electrical	917219	\$365,834.00	ELBE,PQUAL,DVBE,CADIR,SDVS	157 Palm Avenue	Imperial Beach		91932	United States
A-1 Fire Protection, Inc.	Fire Sprinklers	388358	\$29,700.00	CAU,FEM,ELBE,PQUAL,WBE,W	8655 Miramar Place	San Diego		92121	United States
Jenal Engineering Corp.	Fuel Tank	602806	\$26,895.00	PQUAL,SLBE,CADIR	PO Box 459	Lemon Grove		91946	United States
Cats Excavating, Inc.	Earthwork	790422	\$149,339.00	AFR,FEM,ELBE,HUBZ,MBE,CAD	1944 54th street	San Diego		92105	United States
Hurricane & Poway Fence Co., Inc.	Fencing	891123	\$80,027.00	ELBE	209 10th(Hwy 78) Street	Ramona		92065	United States
Centex Glazing	Glazing	806989	\$135,000.00		8260 Commercial Street	La Mesa		91942	United States
Mathews Mechanical	HVAC	886716	\$175,000.00		2428 MANDARIN DRIVE	Corona		92879	United States
MTGL Inc.	Testing and Inspection	None	\$77,333.00	CAU,FEM,DBE,MBE,SDB,WBE	6295 Ferris Square, Suite C	San Diego		92121	United States
dunn painting	Painting	702238	\$54,250.00		po box 255	jamul		91935	United States
Western Foundations & Shoring, Inc.	Shoring	439363	\$35,900.00		10875 Highway 67	Lakeside		92040	United States
West Coast Iron, Inc	Structural Steel	574017	\$299,460.00		9302 Jamacha Rd	Spring Valley		91977	United States
Nurse Stucco, Inc	Lath & Plaster	783696	\$128,070.00	CADIR	12030 Short St	Lakeside		92040	United States
Quality Rebar	Reinforcing Steel	818593	\$99,987.00		PO Box 501877	San Diego		92150	United States
R & M Plumbing Contractors Inc.	Plumbing & Site Utilities	956104	\$307,150.00	ELBE	8825 Diamondback Dr.	Santee		92071	United States
Tiffany Structures	Sprung Structure	977563	\$35,076.00		PO Box 3640	Ramona		92065	United States
Tile/Marble Technology Corporation	Tile	641825	\$45,200.00		11211 Sorrento Valley Rd Ste N	San Diego		92121	United States
ACCI Roofing Services	Roofing	840297	\$72,500.00	LAT,FEM,CADIR	11325 Santa Maria Avenue	Lakeside		92040	United States
Tubbs Enterprises, Inc.	Gypsum Board	314739	\$102,900.00	CADIR	2620 Aurora Glen	Escondido		92027	United States
Buxcon Sheet Metal Inc	Sheet Metal	831448	\$117,390.00		11222 Woodside Avenue North	Santee		92071	United States
AAIR Purification System	Vehicle Exhaust System	621360	\$50,648.00		9040 Kenamar Drive	San Diego		92121	United States
Tru Line Masonry	Masonry	992159	\$26,375.00		7390 Gatewood Lane	San Diego		92114	United States
Solar Horizons Developers	Photovoltaic System	698457	\$49,500.00		7106 E Columbus Drive	Anaheim		92807	United States
King Construction	Waterproofing & Joint Sealants	716883	\$32,000.00		1155 Oak Avenue	Carlsbad		92008	United States
Whillock Contracting Inc	Demolition	572217	\$61,110.00	PQUAL,CADIR	P.O Box 2322	La Mesa		91943	United States
Real Escape, Inc.	Landscaping	596851	\$51,000.00		P O Box 460100	Escondido		92046	United States

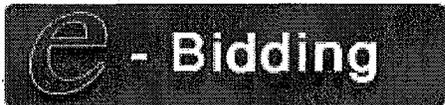
Self Performance
53.05%

City of San Diego

CITY CONTACT: LISA NGUYEN, Contract Specialist, Email: LTNguyen@sandiego.gov

Phone No. (619) 533-3435, Fax No. (619) 533-3633

ADDENDUM "C"



FOR



POINT LOMA FIRE STATION NO. 22

BID NO.:	<u>K-16-5414-DBB-3</u>
SAP NO. (WBS/IO/CC):	<u>S-00787</u>
CLIENT DEPARTMENT:	<u>1912</u>
COUNCIL DISTRICT:	<u>2</u>
PROJECT TYPE:	<u>BC</u>

BID DUE DATE:

2:00 PM
DECEMBER 23, 2015
CITY OF SAN DIEGO
PUBLIC WORKS CONTRACTS
1010 SECOND AVENUE, 14th FLOOR, MS 614C
SAN DIEGO, CA 92101

ENGINEER OF WORK

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



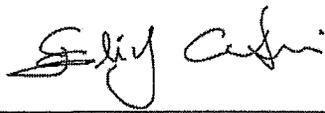
1) Registered Engineer/Architect

12/15/15

Date

Seal:





2) For City Engineer

12/15/15

Date

Seal



A. CHANGES TO CONTRACT DOCUMENTS

The following changes to the Contract Documents are hereby made effective as though originally issued with the bid package. Bidders are reminded that all previous requirements to this solicitation remain in full force and effect.

B. BIDDER'S QUESTIONS

- Q1.** Which type of blinds will be required: 1" mini-blinds or vertical blinds or horizontal blinds?
- A1.** Provide vertical blinds at all exterior doors and windows, all clerestory windows will be factory tinted finish.
- Q2.** Existing spot elevations shown on C-4 don't correspond to the existing contour lines. Example is boring #5 was performed at an elevation of 260.00. The spot elevation at the B5 boring location is about 258.00. If you compare the contour lines with the contour lines in the access road, they match up better. In order to quantify the soil to be removed and quantify the shoring required, we need to know what the existing elevations are. Please clarify which is correct, spot elevations or contour lines or boring logs.
- A2.** Per civil engineer's response, the spot elevation as shown on sheet C-4 are accurate. Any difference you are seeing may be due to a datum change that was encountered much earlier for this project. GC to refer to grading plan.
- Q3.** The SDG&E Electrical Service Invoice provided in addendum B is calling to intercept existing conduit and SDG&E will install a 200AMP meter pedestal. The single line drawings on E3.1 for the temporary site calls for a 400AMP service. Please clarify which is correct.
- A3.** Per E3.1, 400AMP service is correct, SDG&E to update their design.
- Q4.** The door schedule on A8.01 shows most of the doors as W.D. with a finish of H.M. The abbreviations legend shows H.M. as Hollow Metal and there is no W.D. abbreviation, but would expect that to be Wood Doors. Wood door spec calls for a finish of P-lam or paint. Please clarify the door finish and material.
- A4.** See revised sheet A8.01, added "SL. – CLEAR MATTE LACQUER FINISH" and "WD. – WOOD" to Door Schedule Abbreviations and revised door schedule for "WD." doors finish to "SL".

- Q5.** Finish schedule on A8.03 under the CAB column (cabinet) calls for WD2. The abbreviations for WD2 is "Birch, Natural, Doors to be slab doors, stainless steel wire pulls, color by architect. See A8.01 door standards". Details of the cabinets are showing p-lam cabinet exteriors. Please clarify the cabinets are to be Birch, Natural or p-lam.
- A5.** See revised sheets A8.03 and A9.08 for casework information and details.
- Q6.** The same finish schedule does not show anything under the CAB (cabinet) column for the Dorm rooms or Captain Dorm Etc. Please clarify do the dorm rooms get built in desk and lockers or is it part of the FF&E allowance.
- A6.** See revised sheets A8.03 and A9.08 for casework information and details. Desks and lockers in Dorm rooms and Captain Dorm are not a part of FF&E, contractor to provide.
- Q7.** If the bed is to be part of the contract we need a detail on how to build it. Please clarify the beds are part of FF&E or provide a detail on how to build the beds.
- A7.** Beds are part of FF&E.
- Q8.** Please provide the material for the Art and Glass Tile walls.
- A8.** 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 project.

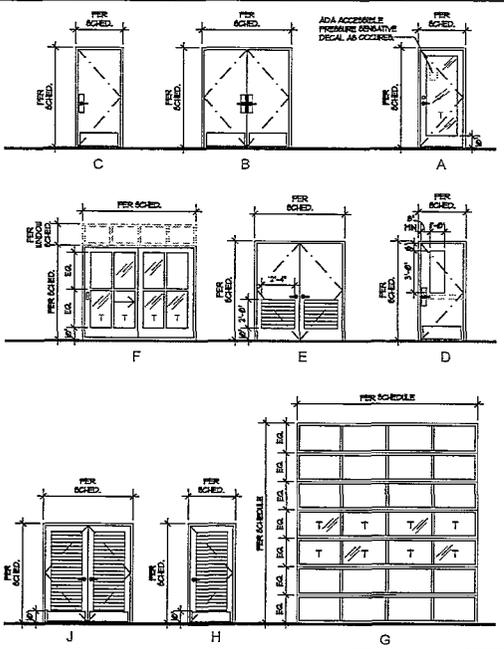
A. PLANS

1. To DRAWING numbered 31704-01-D (T-1), 31704-48-D (A8.01), 31704-49-D (A8.02), 31704-50-D (A8.03), 31704-58-D (A9.08). **DELETE** in their entirety and **SUBSTITUTE** with pages 5 through 9 of this Addendum.

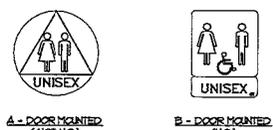
James Nagelvoort, Director
Public Works Department

Dated: *December 16, 2015*
San Diego, California

JN/AJL/lji



DOOR TYPES SCALE 1/4" = 1'-0" 2



UNISEX DOOR & WALL SIGN SCALE 1/12" = 1'-0" 6

NOTE:

1. SIGN SHALL BE 24" DIAMETER CIRCLES 1/4" THICK WITH 1/8" THICK TRANSPARENT SUPER-POURED WITH IN THE CIRCLE.
2. CENTER SIGN ON THE DOOR AT A HEIGHT OF 5'-4" AFF.
3. SIGN SHALL BE IDENTICALLY DIFFERENT FROM DOOR IN COLOR AND CONTRAST.

NOTE:

1. LETTERING SHALL BE 1/2" HIGH TO 1/4" IN HEIGHT.
2. LETTERING SHALL BE IN UPPER CASE.
3. LETTERING SHALL BE RAISED 1/8".
4. CORRESPONDING GRADE IS BRILLE.
5. CENTER SIGN ON THE DOOR AT A HEIGHT OF 5'-4" AFF.

DOOR SCHEDULE

BELOW GRADE FLOOR														
DOOR NO.	ROOM LOCATION	TYPE	SIZE	THICK.	MATL.	FINISH	RATING	FRAM. SET (SEC. 08719)	MATL.	FIN.	HEAD	JAMB	SILL	REMARKS (REFER TO DOOR SCHEDULE NOTES ON THIS SHEET)
001	EQUIPMENT ROOM	C	3'-0" X 7'-0"	1.34"	H.M.	PNT	N.R.	04	H.M.	PNT	3/8x.04	3/8x.04	1/2x.04(3/8")	
FIRST FLOOR														
DOOR NO.	ROOM LOCATION	TYPE	SIZE	THICK.	MATL.	FINISH	RATING	FRAM. SET (SEC. 08719)	MATL.	FIN.	HEAD	JAMB	SILL	REMARKS (REFER TO DOOR SCHEDULE NOTES ON THIS SHEET)
100	WAITING/RECEPTION AREA	A	3'-0" X 7'-0"	1.34"	ALUM.	PNT	N.R.	01	ALUM.	PNT	4/8x.04	5/8x.04	1/2x.04(3/8")	1, 3, 4, 7, 9
101	HALL	A	3'-0" X 7'-0"	1.34"	ALUM.	PNT	N.R.	01	ALUM.	PNT	6/8x.04	4/8x.04	1/2x.04(3/8")	9
102	DINING	F	8'-0" X 7'-0"	1.34"	ALUM.	PNT	N.R.	17	ALUM.	PNT	5/8x.04	5/8x.04	1/2x.04	
103	APPARATUS	G	13'-0" X 14'-0"	1.34"	-	F.F.	N.R.	16	F.F.	P.C.	1/2x.04	1/2x.04	-	8
104	APPARATUS	G	13'-0" X 14'-0"	1.34"	-	F.F.	N.R.	16	F.F.	P.C.	1/2x.04	1/2x.04	-	8
105	ELECTRICAL ROOM	B	12'-0" X 7'-0"	1.34"	H.M.	PNT	N.R.	02	H.M.	PNT	3/8x.04	3/8x.04	1/2x.04(3/8")	
107	FIRE REER ROOM	C	1'-0" X 7'-0"	1.34"	H.M.	PNT	N.R.	03	H.M.	PNT	3/8x.04	3/8x.04	1/2x.04(3/8")	
108	UNISEX REST ROOM	C	3'-0" X 7'-0"	1.34"	H.M.	PNT	N.R.	05	H.M.	PNT	1/8x.04	5/8x.04	1/2x.04	3, 5
110	HALL WAY	D	3'-0" X 7'-0"	1.34"	WD.	SL	N.R.	10	H.M.	PNT	1/8x.04	5/8x.04	1/2x.04	2
111	TEL./COMM.	C	3'-0" X 7'-0"	1.34"	WD.	SL	N.R.	07	H.M.	PNT	1/8x.04	5/8x.04	1/2x.04	
112	DORM ROOM 5	C	3'-0" X 7'-0"	1.34"	WD.	SL	N.R.	11	H.M.	PNT	1/8x.04	5/8x.04	-	
113	DORM ROOM 4	C	3'-0" X 7'-0"	1.34"	WD.	SL	N.R.	11	H.M.	PNT	1/8x.04	5/8x.04	-	
114	BATH ROOM 1	C	3'-0" X 7'-0"	1.34"	WD.	SL	N.R.	06	H.M.	PNT	1/8x.04	5/8x.04	1/2x.04	
115	CAPTAIN'S ROOM	C	3'-0" X 7'-0"	1.34"	WD.	SL	N.R.	08	H.M.	PNT	1/8x.04	5/8x.04	-	
116	BATH ROOM 2	C	3'-0" X 7'-0"	1.34"	WD.	SL	N.R.	5	H.M.	PNT	1/8x.04	5/8x.04	1/2x.04	
117	DORM ROOM 3	C	3'-0" X 7'-0"	1.34"	WD.	SL	N.R.	11	H.M.	PNT	1/8x.04	5/8x.04	-	
118	DORM ROOM 2	C	3'-0" X 7'-0"	1.34"	WD.	SL	N.R.	11	H.M.	PNT	1/8x.04	5/8x.04	-	
119	DORM ROOM 1	C	3'-0" X 7'-0"	1.34"	WD.	SL	N.R.	11	H.M.	PNT	1/8x.04	5/8x.04	-	
120	BATH ROOM 3	C	3'-0" X 7'-0"	1.34"	WD.	SL	N.R.	06	H.M.	PNT	1/8x.04	5/8x.04	1/2x.04	
121	DAY ROOM	D	3'-0" X 7'-0"	1.34"	WD.	SL	N.R.	10	H.M.	PNT	1/8x.04	5/8x.04	-	2
122	STORAGE 1	B	4'-0" X 7'-0"	1.34"	WD.	SL	N.R.	15	H.M.	PNT	1/8x.04	5/8x.04	-	
123	WATER HEATER ROOM	E	4'-0" X 7'-0"	1.34"	WD.	SL	N.R.	15	H.M.	PNT	1/8x.04	5/8x.04	1/2x.04	6
124	APPARATUS	D	3'-0" X 7'-0"	1.34"	WD.	SL	45 MIN.	04	H.M.	PNT	2/8x.04	5/8x.04	1/2x.04	1, 2, 6
125	APPARATUS	D	3'-0" X 7'-0"	1.34"	WD.	SL	N.R.	-	H.M.	PNT	2/8x.04	5/8x.04	1/2x.04	2, 6
126	APPARATUS	D	3'-0" X 7'-0"	1.34"	WD.	SL	45 MIN.	04	H.M.	PNT	2/8x.04	5/8x.04	1/2x.04	1, 2, 3, 6
127	APPARATUS	D	3'-0" X 7'-0"	1.34"	WD.	SL	45 MIN.	04	H.M.	PNT	2/8x.04	5/8x.04	1/2x.04	1, 2, 3, 6
128	APPARATUS/WATCH RECP.	D	3'-0" X 7'-0"	1.34"	WD.	SL	45 MIN.	04	H.M.	PNT	2/8x.04	5/8x.04	1/2x.04	1, 2, 3, 6
129	APPARATUS	B	6'-0" X 7'-0"	1.34"	WD.	SL	N.R.	14	H.M.	PNT	2/8x.04	5/8x.04	1/2x.04	
130	APPARATUS	B	6'-0" X 7'-0"	1.34"	WD.	SL	N.R.	14	H.M.	PNT	2/8x.04	5/8x.04	1/2x.04	
131	APPARATUS	J	6'-0" X 7'-0"	1.34"	WD.	SL	N.R.	14	H.M.	PNT	2/8x.04	5/8x.04	1/2x.04	
132	APPARATUS/1/2 Q. GEAR	D	3'-0" X 7'-0"	1.34"	WD.	SL	N.R.	12	H.M.	PNT	2/8x.04	5/8x.04	1/2x.04	1, 2, 3, 6
133	APPARATUS	J	6'-0" X 7'-0"	1.34"	WD.	SL	N.R.	14	H.M.	PNT	2/8x.04	5/8x.04	1/2x.04	
134	APPARATUS	H	3'-0" X 7'-0"	1.34"	WD.	SL	N.R.	13	H.M.	PNT	2/8x.04	5/8x.04	1/2x.04	

DOOR SCHEDULE ABBREVIATIONS:

ALUM.	ALUMINUM	GL.	GLASS	PNT.	PAINT
F.G.	FIBERGLASS	H.M.	HOLLOWMETAL	P.C.	POWDER COAT FINISH
F.F.	FACTORY FINISH	MANUF.	PER MANUFACTURER	S.C.W.	SOLID CORE WOOD
F.T.	FACTORY THICKNESS	N.R.	NON RATED	SL.	CLEAR WHITE LACQUER FINISH

T TEMPERED
WG. WOOD

GENERAL NOTES

1. ALL COLORS FOR DOORS AND DOORS SHALL BE IDENTIFIED AND APPROVED PRIOR TO NOTICE TO PROCEED.
2. DOORS AND WINDOWS SHALL MEET THE TYPICAL MITIGATION REQUIREMENTS PER SECTION 16.05A.
3. FIELD VERIFY ALL DOOR ROUGH OPENINGS PRIOR TO ORDER AND INSTALLATION.
4. REFER TO APPARATUS DOOR NOTES ON SHEET G04 FOR ADDITIONAL INFORMATION.
5. REFER TO APPLICATION SECTION 08700 FOR ALL DOOR HARDWARE SET INFORMATION.
6. THE FORCE TO OPERATE DOORS SHALL BE WITHIN 5 LBS. FORCE PER ADA AG 404.4 CODE REQUIRE.

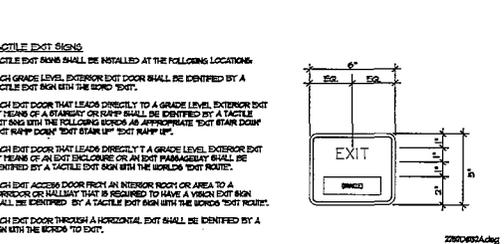
SDFR DOOR NOTES

1. ALL EXTERIOR DOORS AND WINDOWS SHALL BE CONSTRUCTED OF A MATERIAL THAT IS NOT AFFECTED BY RAINFALL. INCLUDE DUAL PANE WITH HIGH PERFORMANCE LOG-54 GLASS, WEATHER-TIGHT FRAMED SIDING AND SEALA.
2. ALL EXTERIOR DOORS SHALL BE 5'-0" X 7'-0" (STANDARD 3660) METAL AND METAL FINISH.
3. EXTERIOR FRONT ENTRY/REAR ENTRY DOORS MAY BE STORE FRONT TYPE AND PATIO DOORS TO BE GLASS SLIDING AS APPROVED BY FIRE-RESISTE DEPT.
4. ALL INTERIOR DOORS SHALL BE OF AN EXTERIOR GRADE OR APPROVED EQUAL. ALL EXTERIOR DOORS SHALL BE 5'-0" X 7'-0" AND BEING IN THE DIRECTION OF THE APPARATUS FLOOR AREA (UNGL.) EXCEPT DOORS ENTERING INTO A HALL THAT WILL OPEN IN.
5. PANIC HARDWARE IS REQUIRED ON INTERIOR DOORS LEADING DIRECTLY INTO THE APPARATUS AREA.
6. PANIC LOCKS AND LATCH SETS ARE TO BE UTILIZED ON INTERIOR DOORS WHICH LEAD TO SLEEPING AREAS (EXCEPT AS THAT BE REQUIRED BY CODE).
7. LOCK SETS WILL BE BY BEST (OR APPROVED EQUAL) AND SHALL HAVE 1. REVISED FIN BEST CORES ON ALL LOCKING DOORS.
8. DOORS WILL HAVE UNISEX AREA AS APPROVED BY CODE, EXCEPT AT RESTROOMS, DORM ROOMS AND STORAGE ROOMS.
9. DOORS LEADING TO RESTROOMS, APPARATUS ROOM AND THE EXTERIOR OF STATION SHALL HAVE MECHANICAL CLOSURES.
10. STAINLESS STEEL, FURN PLATES AND KICK PLATES WILL BE INSTALLED ON ALL DOORS.
11. DOORBELLS SHALL BE INTERFACED WITH THE STATION ALERTING SYSTEM THAT BRING ALL AREAS OF THE STATION THEY ARE TO BE INSTALLED ON BOTH FRONT AND REAR EXTERIOR DOORS WITH DIFFERENT TONES FOR EACH.
12. PROVIDE A HANDLE IN ACCORDANCE WITH PORTAL. BARRIER SYSTEMS SHALL BE A FULL 18" IS PROVIDED IN A DOOR OR THROUGH AN EXTERIOR WALL. THE ACCESS DOOR COVER SHALL COVER THE ENTIRE FULL BLUET OPENING AND OPEN OUTWARDLY. THIS WILL PREVENT SEAMERS AND WATER DAMAGE TO INTERIOR OF THE STATION. IT SHOULD BE LOCATED ON THE STREET SIDE OF THE DOOR. IT SHALL BE LOCKABLE, WATER TIGHT, AND SIZED TO ACCEPT MAGAZINES.

DOOR SCHEDULE NOTES

1. PANTIC HARDWARE REQUIRED
2. TEMPERED GLASS VED UNIFORM
3. INTERNATIONAL SYMBOL OF ACCESSIBILITY TO BE MOUNTED ON DOOR AT 5'-4" AFF. SEE DETAIL 6/A
4. BRILL EXIT SIGN TO BE INSTALLED 5'-4" AFF. AT INTERIOR SEE DETAIL 6/B
5. UNISEX ACCESSIBLE SIGN
6. LOWER DOOR FOR VENTILATION
7. DOOR HALL BLUET
8. WIRED TO EMERGENCY ELECTRICAL CIRCUIT
9. PROVIDE DOOR ACTUATOR ALSO SEE KEYNOTE SIGN FOR ADDITIONAL INFORMATION

INTERNATIONAL SYMBOL OF ACCESSIBILITY



BRILLE EXIT SIGN SCALE 3/8" = 1'-0" 5

INTERNATIONAL SYMBOL OF ACCESSIBILITY

1. ALL BUILDING ENTRANCES THAT ARE ACCESSIBLE TO AND USABLE BY PERSONS WITH DISABILITIES AND OTHER ADDITIONAL DIRECTIONAL SIGNS, AS REQUIRED, TO BE VISIBLE TO PERSONS ALONG APPROVED PEDESTRIAN PATHS.
2. ALL BUILDING ENTRANCES THAT ARE ACCESSIBLE TO AND USABLE BY PERSONS WITH DISABILITIES AND OTHER ADDITIONAL DIRECTIONAL SIGNS, AS REQUIRED, TO BE VISIBLE TO PERSONS ALONG APPROVED PEDESTRIAN PATHS.
3. ALL BUILDING ENTRANCES THAT ARE ACCESSIBLE TO AND USABLE BY PERSONS WITH DISABILITIES AND OTHER ADDITIONAL DIRECTIONAL SIGNS, AS REQUIRED, TO BE VISIBLE TO PERSONS ALONG APPROVED PEDESTRIAN PATHS.
4. WHEN NEEDED CHARACTERS OR SYMBOLS ARE USED, THEY SHALL CONFORM TO THE FOLLOWING:
 - a. LETTERS AND NUMBERS ON SIGNS SHALL BE NAMED OR REGISTERED WITH FONTS AND SHALL BE SAN-SERIF APPROPRIATE CHARACTERS ACCOMPANIED BY GRADE 2 BRILLE.
 - b. NAMED CHARACTERS OR SYMBOLS SHALL BE A FIFTH OF AN" HIGH (MINIMUM OF 2").
 - c. PICTORIAL SYMBOL SIGNS (PICTOGRAMS) SHALL BE ACCOMPANIED BY THE VISUAL IDENTIFICATION PLACED DIRECTLY BELOW THE PICTORIAL. THE OUTSIDE DIMENSION OF THE PICTORIAL SHALL BE A FIFTH OF AN" HIGH.

INTERNATIONAL SYMBOL OF ACCESSIBILITY SCALE 3/8" = 1'-0" 3

DOOR SCHEDULE

DOOR NO.	ROOM LOCATION	TYPE	SIZE	THICK.	MATL.	FINISH	RATING	FRAM. SET (SEC. 08719)	MATL.	FIN.	HEAD	JAMB	SILL	REMARKS (REFER TO DOOR SCHEDULE NOTES ON THIS SHEET)
001	EQUIPMENT ROOM	C	3'-0" X 7'-0"	1.34"	H.M.	PNT	N.R.	04	H.M.	PNT	3/8x.04	3/8x.04	1/2x.04(3/8")	

DOOR SCHEDULE SCALE N.T.S. 1

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DATE STARTED: _____
DATE COMPLETED: _____

INSPECTOR

PLANS FOR THE CONSTRUCTION OF POINT LOMA FIRE STATION NO. 22

DOOR SCHEDULE

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 48 OF 113 SHEETS

WBS S-00787

PROJECT MANAGER: MICHAEL MARIA

PROJECT ENGINEER: _____

DESCRIPTION	BY	APPROVED	DATE	FILED
ORIGINAL	NADEL	[Signature]	12.15.16	
ALTERNATE/REVISION	NADEL	[Signature]		

202-1609
COST CODE SHEET

204-1692
COST CODE SHEET

31704-48-D

WINDOW SCHEDULE

FIRST FLOOR																
WINDOW NO.	ROOM NO.	ROOM LOCATION	WINDOW			THICK.	TEMP.	FRAME			DETAIL			REMARKS		
			TYPE	STYLE	SIZE (W x H)			FIN.	SILL HT.	HEAD HT.	HEAD	JAMB	SILL			
107	119	ELECTRICAL ROOM	A	AWNING	3'-4" X 1'-4"	-	-	ALUM.	FF	7'-0"	8'-4"	10'-0.00	10'-0.00	3'-0.00	-	
101	124	T/O GEAR ROOM	A	AWNING	3'-4" X 1'-4"	-	-	ALUM.	FF	7'-0"	8'-4"	10'-0.00	10'-0.00	3'-0.00	-	
102	124	T/O GEAR ROOM	A	AWNING	3'-4" X 1'-4"	-	-	ALUM.	FF	7'-0"	8'-4"	10'-0.00	10'-0.00	3'-0.00	-	
103	124	T/O GEAR ROOM	A	AWNING	3'-4" X 1'-4"	-	-	ALUM.	FF	7'-0"	8'-4"	10'-0.00	10'-0.00	3'-0.00	-	
104	122	WATCH/RECEPTION AREA	B	FIXED / SM/T.	4'-0" X 9'-4"	-	-	T	ALUM.	FF	0'-0"	7'-0"	10'-0.00	10'-0.00	-	
105	122	WATCH/RECEPTION AREA	C	FIXED / SM/T.	4'-0" X 9'-4"	-	-	-	ALUM.	FF	3'-0"	9'-4"	7'-12.00.00	3'-0.00	-	
106	122	WATCH/RECEPTION AREA	C	FIXED / SM/T.	4'-0" X 9'-4"	-	-	-	ALUM.	FF	3'-0"	9'-4"	7'-12.00.00	3'-0.00	-	
107	121	WORK OUT ROOM	A	AWNING	3'-4" X 1'-4"	-	-	ALUM.	FF	7'-0"	8'-4"	10'-0.00	10'-0.00	3'-0.00	-	
108	121	WORK OUT ROOM	A	AWNING	3'-4" X 1'-4"	-	-	ALUM.	FF	7'-0"	8'-4"	10'-0.00	10'-0.00	3'-0.00	-	
109	121	WORK OUT ROOM	A	AWNING	3'-4" X 1'-4"	-	-	ALUM.	FF	7'-0"	8'-4"	10'-0.00	10'-0.00	3'-0.00	-	
110	121	WORK OUT ROOM	A	AWNING	3'-4" X 1'-4"	-	-	ALUM.	FF	7'-0"	8'-4"	10'-0.00	10'-0.00	3'-0.00	-	
111	121	WORK OUT ROOM	D	CSMT.	5'-6" X 4'-0"	-	-	ALUM.	FF	3'-0"	7'-0"	10'-0.00	10'-0.00	3'-0.00	-	
112	117	DORM ROOM 5	D	CSMT.	4'-4" X 4'-0"	-	-	ALUM.	FF	3'-0"	7'-0"	10'-0.00	10'-0.00	3'-0.00	-	
113	116	DORM ROOM 4	D	CSMT.	4'-4" X 4'-0"	-	-	ALUM.	FF	3'-0"	7'-0"	10'-0.00	10'-0.00	3'-0.00	-	
114	119	BATH ROOM 1	E	CSMT.	2'-0" X 2'-0"	-	-	ALUM.	FF	6'-0"	7'-0"	10'-0.00	10'-0.00	3'-0.00	-	
115	114	CAPTAIN'S ROOM	D	CSMT.	3'-0" X 4'-0"	-	-	ALUM.	FF	3'-0"	7'-0"	10'-0.00	10'-0.00	3'-0.00	-	
116	114	CAPTAIN'S ROOM	D	CSMT.	3'-0" X 4'-0"	-	-	ALUM.	FF	3'-0"	7'-0"	10'-0.00	10'-0.00	3'-0.00	-	
117	114	CAPTAIN'S ROOM	D	CSMT.	3'-0" X 4'-0"	-	-	ALUM.	FF	3'-0"	7'-0"	10'-0.00	10'-0.00	3'-0.00	-	
118	113	HALL	F	FIXED	2'-0" X 7'-0"	-	-	T	ALUM.	FF	0'-0"	7'-0"	12'-0.00.00	6'-0.00	-	
119	109	DORM ROOM 3	D	CSMT.	4'-4" X 4'-0"	-	-	ALUM.	FF	3'-0"	7'-0"	10'-0.00	10'-0.00	3'-0.00	-	
120	108	DORM ROOM 2	D	CSMT.	4'-4" X 4'-0"	-	-	ALUM.	FF	3'-0"	7'-0"	10'-0.00	10'-0.00	3'-0.00	-	
121	107	DORM ROOM 1	D	CSMT.	4'-4" X 4'-0"	-	-	ALUM.	FF	3'-0"	7'-0"	10'-0.00	10'-0.00	3'-0.00	-	
122	104	DINING ROOM	D	CSMT.	4'-4" X 4'-0"	-	-	ALUM.	FF	3'-0"	7'-0"	10'-0.00	10'-0.00	3'-0.00	-	
123	104	DINING ROOM	G	FIXED	1'-6" X 8'-4"	-	-	ALUM.	FF	7'-0"	8'-4"	10'-0.00	10'-0.00	11'-0.00	-	
124	103	KITCHEN	P	FIXED	8'-0" X 8'-0"	-	-	ALUM.	FF	3'-4"	8'-4"	10'-0.00	10'-0.00	3'-0.00	-	
125	103	KITCHEN	E	CSMT.	3'-0" X 8'-0"	-	-	ALUM.	FF	3'-4"	8'-4"	10'-0.00	10'-0.00	3'-0.00	-	
126	103	KITCHEN	E	CSMT.	3'-0" X 8'-0"	-	-	ALUM.	FF	3'-4"	8'-4"	10'-0.00	10'-0.00	3'-0.00	-	
127	102	DAY ROOM	H	CSMT. / FIXED	6'-0" X 8'-4"	-	-	T	ALUM.	FF	0'-0"	8'-4"	10'-0.00	10'-0.00	-	

CLEAR STORY																
WINDOW NO.	ROOM NO.	ROOM LOCATION	TYPE	STYLE	SIZE (W x H)	THICK.	TEMP.	MATL.	FIN.	SILL HT.	HEAD HT.	HEAD	JAMB	SILL	REMARKS	
200	-	CLEARSTORY	L	FIXED	5'-6" X 3'-0"	-	-	ALUM.	FF	19'-4"	22'-4"	9'-0.00	14'-10'-0.00	13'-0.00	FACTORY TINTED GLAZING	
201	-	CLEARSTORY	A	AWNING	5'-6" X 3'-0"	-	-	ALUM.	FF	19'-4"	22'-4"	9'-0.00	14'-10'-0.00	13'-0.00	FACTORY TINTED GLAZING	
202	-	CLEARSTORY	L	FIXED	5'-6" X 3'-0"	-	-	ALUM.	FF	19'-4"	22'-4"	9'-0.00	14'-10'-0.00	13'-0.00	FACTORY TINTED GLAZING	
203	-	CLEARSTORY	L	FIXED	5'-6" X 3'-0"	-	-	ALUM.	FF	19'-4"	22'-4"	9'-0.00	14'-10'-0.00	13'-0.00	FACTORY TINTED GLAZING	
204	-	CLEARSTORY	A	AWNING	5'-6" X 3'-0"	-	-	ALUM.	FF	19'-4"	22'-4"	9'-0.00	14'-10'-0.00	13'-0.00	FACTORY TINTED GLAZING	
205	-	CLEARSTORY	L	FIXED	5'-6" X 3'-0"	-	-	ALUM.	FF	19'-4"	22'-4"	9'-0.00	14'-10'-0.00	13'-0.00	FACTORY TINTED GLAZING	
206	-	CLEARSTORY	L	FIXED	5'-6" X 3'-0"	-	-	ALUM.	FF	19'-4"	22'-4"	9'-0.00	14'-10'-0.00	13'-0.00	FACTORY TINTED GLAZING	
207	-	CLEARSTORY	N	FIXED	5'-6" X 1'-0"	-	-	ALUM.	FF	23'-0"	VARIABLE	9'-0.00 (FORM)	14'-10'-0.00	12'-0.00	FACTORY TINTED GLAZING	
208	-	CLEARSTORY	A	AWNING	5'-6" X 3'-0"	-	-	ALUM.	FF	19'-4"	22'-4"	9'-0.00	14'-10'-0.00	13'-0.00	FACTORY TINTED GLAZING	
209	-	CLEARSTORY	N	FIXED	5'-6" X 3'-0"	-	-	ALUM.	FF	23'-0"	VARIABLE	9'-0.00	14'-10'-0.00	10'-0.00	FACTORY TINTED GLAZING	
210	-	CLEARSTORY	A	AWNING	5'-6" X 3'-0"	-	-	ALUM.	FF	19'-4"	22'-4"	9'-0.00	14'-10'-0.00	13'-0.00	FACTORY TINTED GLAZING	
211	-	CLEARSTORY	N	FIXED	5'-6" X 3'-0"	-	-	ALUM.	FF	23'-0"	VARIABLE	9'-0.00	14'-10'-0.00	10'-0.00	FACTORY TINTED GLAZING	
212	-	CLEARSTORY	L	FIXED	5'-6" X 3'-0"	-	-	ALUM.	FF	19'-4"	22'-4"	9'-0.00	14'-10'-0.00	13'-0.00	FACTORY TINTED GLAZING	
213	-	CLEARSTORY	N	FIXED	5'-6" X 1'-0"	-	-	ALUM.	FF	23'-0"	VARIABLE	9'-0.00	14'-10'-0.00	10'-0.00	FACTORY TINTED GLAZING	
214	-	CLEARSTORY	L	FIXED	5'-6" X 3'-0"	-	-	ALUM.	FF	19'-4"	22'-4"	9'-0.00	14'-10'-0.00	13'-0.00	FACTORY TINTED GLAZING	
215	-	CLEARSTORY	A	AWNING	5'-6" X 3'-0"	-	-	ALUM.	FF	19'-4"	22'-4"	9'-0.00	14'-10'-0.00	13'-0.00	FACTORY TINTED GLAZING	
216	-	CLEARSTORY	L	FIXED	5'-6" X 3'-0"	-	-	ALUM.	FF	19'-4"	22'-4"	9'-0.00	14'-10'-0.00	13'-0.00	FACTORY TINTED GLAZING	
217	-	CLEARSTORY	L	FIXED	5'-6" X 3'-0"	-	-	ALUM.	FF	19'-4"	22'-4"	9'-0.00	14'-10'-0.00	13'-0.00	FACTORY TINTED GLAZING	
218	-	CLEARSTORY	A	AWNING	5'-6" X 3'-0"	-	-	ALUM.	FF	19'-4"	22'-4"	9'-0.00	14'-10'-0.00	13'-0.00	FACTORY TINTED GLAZING	
219	-	CLEARSTORY	L	FIXED	5'-6" X 3'-0"	-	-	ALUM.	FF	19'-4"	22'-4"	9'-0.00	14'-10'-0.00	13'-0.00	FACTORY TINTED GLAZING	
220	-	CLEARSTORY	L	FIXED	5'-6" X 3'-0"	-	-	ALUM.	FF	19'-4"	22'-4"	9'-0.00	14'-10'-0.00	13'-0.00	FACTORY TINTED GLAZING	
221	-	CLEARSTORY	N	FIXED	5'-6" X 1'-0"	-	-	ALUM.	FF	23'-0"	VARIABLE	9'-0.00	14'-10'-0.00	10'-0.00	FACTORY TINTED GLAZING	
222	-	CLEARSTORY	A	AWNING	5'-6" X 3'-0"	-	-	ALUM.	FF	19'-4"	22'-4"	9'-0.00	14'-10'-0.00	13'-0.00	FACTORY TINTED GLAZING	
223	-	CLEARSTORY	N	FIXED	5'-6" X 3'-0"	-	-	ALUM.	FF	23'-0"	VARIABLE	9'-0.00	14'-10'-0.00	10'-0.00	FACTORY TINTED GLAZING	
224	-	CLEARSTORY	A	AWNING	5'-6" X 3'-0"	-	-	ALUM.	FF	19'-4"	22'-4"	9'-0.00	14'-10'-0.00	13'-0.00	FACTORY TINTED GLAZING	
225	-	CLEARSTORY	N	FIXED	5'-6" X 3'-0"	-	-	ALUM.	FF	23'-0"	VARIABLE	9'-0.00	14'-10'-0.00	10'-0.00	FACTORY TINTED GLAZING	
226	-	CLEARSTORY	L	FIXED	5'-6" X 3'-0"	-	-	ALUM.	FF	19'-4"	22'-4"	9'-0.00	14'-10'-0.00	13'-0.00	FACTORY TINTED GLAZING	
227	-	CLEARSTORY	N	FIXED	5'-6" X 1'-0"	-	-	ALUM.	FF	23'-0"	VARIABLE	9'-0.00	14'-10'-0.00	10'-0.00	FACTORY TINTED GLAZING	

GENERAL NOTES

- ALL COLORS FOR DOORS AND WINDOWS SHALL BE IDENTIFIED AND APPROVED PRIOR TO NOTICE TO PROCEED.
- DOORS AND WINDOWS SHALL MEET THE FINEST INfiltration REQUIREMENTS PER SECTION 05 20 00.
- FIELD VERIFY ALL DOOR ROUGH OPENINGS PRIOR TO ORDERING AND INSTALLATION.
- UNDO FRAME COLOR TO BE APPROVED BY ARCHITECT. PROVIDE SAMPLE PRIOR TO INSTALLATION.
- GLAZING FRAMES MADE OF VINYL MATERIALS SHALL HAVE BEVELLED CORNERS, METAL REINFORCEMENT IN THE INTRUSION AREA AND BE CONFORMED TO THE MOST CURRENT EDITIONS OF ANULAM/AMERICA WINDOW STRUCTURAL REQUIREMENTS (CSCS 180322).
- TEMPERED GLASS OR MULTILAYERED GLASS SHALL BE USED FOR GLAZING MATERIALS IN BOLLARDS, ROOF, AND SLOPED WALLS (CSCS 180322).

SDFR WINDOW NOTES

- ALL EXTERIOR DOORS AND WINDOWS SHALL BE CONSTRUCTED OF A MATERIAL THAT IS NOT IMPROVED BY FIRE. INCLUDE DUAL FRAME WITH HIGH PERFORMANCE LOW-E4 GLASS. LEADERS THAT PROVIDE BARRIERS AND SEAL A 3/8" ALUMINUM GLAZING BEAD SHALL BE INSTALLED TO THE INSIDE OF THE DOOR THAT WILL INCREASE FIRE RISK, ENERGY EFFICIENCY AND IMPROVE THE CLEANING AND OTHER MAINTENANCE OF THE WINDOW. INTERIOR SCREENS SHALL BE MADE OF ALUMINUM SCREEN AND INCLUDED ON ALL OPERABLE WINDOWS.
- ALL COLOR FOR WINDOWS, DOORS BOTH INTERIOR AND EXTERIOR SHALL BE IDENTIFIED AND APPROVED PRIOR TO NOTICE TO PROCEED.
- ALL EXTERIOR WINDOWS SHALL BE HIGH QUALITY, NON-LEAKING, DUAL INSULATED GLASS (DOUBLE OR TRIPLE FRAME), THERMALLY EFFICIENT DESIGN, AND BY PROTECTA.
- DOORS AND WINDOWS SHALL BE PROVIDED WITH VERTICAL BLINDS EXCEPT AT CLEANSITE. CLEANSITE WINDOW SHALL HAVE FACTORY TINTED GLAZING.

WINDOW SCHEDULE NOTES

PLANS FOR THE CONSTRUCTION OF
POINT LOMA FIRE STATION NO. 22
WINDOW SCHEDULE

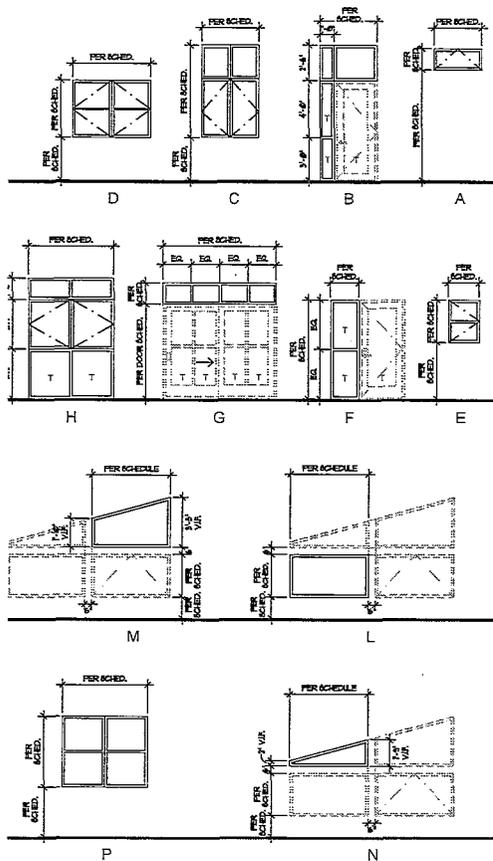
CITY OF SAN DIEGO, CALIFORNIA
F. B. C. WORKS DEPARTMENT
SHEET 49 OF 113 SHEETS

WSS S-00787

DATE STARTED: 12/15/15
DATE COMPLETED: 12/15/15

PROJECT ENGINEER: MICHAEL MARIA
PROJECT MANAGER: MICHAEL MARIA
CHECKED: NADEL
DATE: 12/15/15
COST COORDINATOR: NADEL
DATE: 12/15/15

31704-49-D



WINDOW SCHEDULE ABBREVIATIONS:

ALUM. ALUMINUM T. TEMPERED GLASS
F.G. FIBERGLASS
F.F. FACTORY FINISH
MANUF. PER MANUFACTURER
N.R. NON RATED

WINDOW TYPES SCALE 1/4"=1'-0" 2

WINDOW SCHEDULE SCALE N.T.S. 1

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POINT LOMA FIRE STATION NO. 22

A8.02

ROOM NO.	ROOM NAME	FLOOR		WALL				CEILING			CAB.	NOTES
		FLOOR	BASE	NORTH	EAST	SOUTH	WEST	MATL.	FIN.	FIN. HT.		
FIRST FLOOR												
101	APPARATUS	CS	CS	GB2CT4P3	GB2CT4P3	GB2CT4P3	GB2CT4P3	GB2	P4	18'-4" VARES	6	
102	DAY ROOM	WD1	B1	GB1P1	GB1P1	GB1P1	GB1P1	AC1	MANF.	10'-0"	W02	
103	KITCHEN	CT1	CT3	GB2P3SS	GB2P3SS	GB2P3SS	GB2P3SS	GB2/AC1	PANMANF.	VARES	W02	1, 4, 5
104	LINE	CT1	CT3	GB2P3	GB2P3	GB2P3	GB2P3	GB2/AC1	PANMANF.	VARES	W02	
105	STORAGE	WD1	B1	GB1P1	GB1P1	GB1P1	GB1P1	AC1	MANF.	8'-0"	W02	
106	WATER HEATER	CS	CS	GB2P3	GB2P3	GB2P3	GB2P3	AC1	MANF.	8'-0"	W02	
107	DORM ROOM 1	WD1	B1	GB1P1	GB1P1	GB1P1	GB1P1	AC1	MANF.	8'-0"	W02	
108	DORM ROOM 2	WD1	B1	GB1P1	GB1P1	GB1P1	GB1P1	AC1	MANF.	8'-0"	W02	
109	DORM ROOM 3	WD1	B1	GB1P1	GB1P1	GB1P1	GB1P1	AC1	MANF.	8'-0"	W02	
110	WORK ROOM	CN	CN	GB2P3	GB2P3	GB2P3	GB2P3	AC1	MANF.	8'-0"	W02	
111	BATH 3	CT2	CT3	GB2CT2P3	GB2CT2P3	GB2CT2P3	GB2CT2-4P3	GB2	P4	8'-0"	W02	6
112	BATH 2	CT2	CT3	GB2CT2P3	GB2CT2P3	GB2CT2P3	GB2CT2-4P3	GB2	P4	8'-0"	W02	6
113	HALL	WD1	B1	GB1P1	GB1P1	GB1P1	GB1P1	AC1	MANF.	8'-0"	W02	
114	CAPTAIN DORM	WD1	B1	GB1P1	GB1P1	GB1P1	GB1P1	AC1	MANF.	8'-0"	W02	
115	BATH 1	CT2	CT3	GB2CT2P3	GB2CT2P3	GB2CT2P3	GB2CT2-4P3	GB2	P2	8'-0"	W02	5
116	DORM ROOM 4	WD1	B1	GB1P1	GB1P1	GB1P1	GB1P1	AC1	MANF.	8'-0"	W02	
117	DORM ROOM 5	WD1	B1	GB1P1	GB1P1	GB1P1	GB1P1	AC1	MANF.	8'-0"	W02	
118	TELEPHONE / COMM.	SV1	SV1	GB1P1	GB1P1	GB1P1	GB1P1	GB1P2	NONE	8'-0"	W02	
119	ELECTRICAL	CN	NONE	GB1P1	GB1P1	GB1P1	GB1P1	GB1P2	NONE	-	W02	2
120	FIRE RISER	CN	NONE	GB2	GB2	GB2	GB2	STRUCTURE	NONE	-	W02	
121	WORK OUT	CS	B1	GB1P1	GB1P1	GB1P1	GB1P1	AC1	MANF.	8'-0"	W02	
122	WATCH/RECEPTION	WD1	B1	GB1P1	GB1P1	GB1P1	GB1P1	GB1	P1	VARES	W02	
123	REST ROOM	CT2	CT3	GB2CT2P3	GB2CT2P3	GB2CT2P3	GB2CT2P3	GB2	P2	8'-0"	W02	6
124	TURN-OUT / GEAR	CS	B1	GB2P1	GB2P1	GB2P1	GB2P1	AC1	MANF.	8'-0"	W02	

ABBREVIATIONS

- AC1 ADJUSTABLE CEILING PER SPECIFICATIONS.
- AL ALUMINUM AT SECTIONAL DOOR
- B1 RUBBER BASE BY BURKE 4.2" ART DECO 613 - COLOR TO BE BROWN 022
- CE
- CT1 DALTILE, 12"x12" PFAZZ, P264 GOLDEN GLAMOR, 1/8" GROUT SPACE (TYP.) PRODUCTS, SANDED, LINEN 122, SEAL, 1/8" GROUT SPACE (TYP.) - CUSTOM BUILDING.
- CT2 DALTILE, 12"x12" PFAZZ, P264 GOLDEN GLAMOR, TUBA PATTERN FOR GREASER SCAUD APPEARANCE, 1/8" GROUT SPACE (TYP.) 1/8" GROUT SPACE (TYP.) - CUSTOM BUILDING PRODUCTS, SANDED, LINEN 122, SEAL
- CT3 DALTILE, 6"x6" BULLNOSE PFAZZ, P264 GOLDEN GLAMOR, 1/8" GROUT SPACE (TYP.) BUILDING PRODUCTS, SANDED, LINEN 122, SEAL, 1/8" GROUT SPACE (TYP.) - CUSTOM.
- CT5 DALTILE, 6" x 6", LUMINARY GOLD 9142 SEMI-GLOSS FIELD TILE @ WALL, 6"x6" BULL NOSE AT TOP OF WAINSCOT AND ABOVE SHOWER DALTILE, 6" x 6", CROSS LINEN 0789 MATTE ACCENT TILE @ SHOWERS.
- CN CONCRETE, NATURAL, WITH SEALER
- CS STAINED CONCRETE W/ SEALER - MALAY TAN BY KEMKO
- GB1 5/8" TYPE "C", GYPSUM BOARD
- GB2 5/8" TYPE "C", WATER RESISTANT GYPSUM BOARD (IN APPARATUS ROOM - USE CERTAINTED "HARRISNEW 12 TECH TYP." GYPSUM BOARD OR EQUAL ABOVE 8'-0" A.F.F. - WALLS AND CEILING)
- MANF. MANUFACTURER
- M METAL
- P1 PAINT - INTERIOR FLAT, @ GYP, BD, WALLS, SHERMAN WILLIAMS IVORE SW 6127
- P2 PAINT - INTERIOR FLAT, @ GYP, BD, CEILING, SHERMAN WILLIAMS NAVAJO WHITE SW 6126
- P3 PAINT - INTERIOR SEMI-GLOSS ENAMEL, @ GYP, BD, WALLS, SHERMAN WILLIAMS IVORE SW 6127
- P4 PAINT - INTERIOR SEMI-GLOSS ENAMEL, @ GYP, BD, CEILING, SHERMAN WILLIAMS NAVAJO WHITE SW 6126
- P6 NOT USED
- P7 PAINT - EXTERIOR SEMI-GLOSS, @ STRUCTURAL STEEL, GALLERY, TRELLEIS, ARBOR, SHERMAN WILLIAMS LEATHER BOUND SW 5118
- P8 PAINT - EXTERIOR ACRYLIC @ PLASTER WAINSCOT, PAINT (SHERMAN WILLIAMS HIPSACK SW 6109)
- P9 PAINT - EXTERIOR ACRYLIC @ PLASTER, PAINT (SHERMAN WILLIAMS KILM BEIGE SW 6109)
- P9 PAINT - EXTERIOR POWDERKODAT BY MANF., FIRE ENGINE RED COLOR
- PL1 PLASTER, SMOOTH, INTEGRAL COLOR, BEIGE (SEE SAN MARCOS CIVIC CENTER FOR PLASTER TEXTURE)
- PL2 PLASTER, MED. MACHINE DASH TEXTURE, INTEGRAL COLOR - BROWN (SEE P7)
- SV1 ARMSTRONG STARSTEP SHEET VINYL MARO GRAS-CAT W/ COVE BASE
- TS TAPE & SAND
- WD1 PLYWOOD BAMBINO WOOD FLOORING, HAVANA STRAND PREFINISHED FL-P5872P-HALF 3/4" x 3/4" x 3/4"
- WD2 WOOD BASED CASERWORK FOR GENERAL NOTES AND DETAILS ON SHEETS A-06 AND A3-06.

NOTES

1. STAINLESS STEEL SPLASH AT WALL TO GO BOTTOM OF UPPER CABINETS UNO.
2. INTEGRAL VINYL COVE BASE.
3. WALL SURFACES SHALL BE COVERED WITH A DURABLE VINYL WALL MATERIAL.
4. ALL INTERIOR PAINT SHALL BE 100% ACRYLIC SEMI GLOSS FINISH.
5. ALL OUTSIDE CORNERS WITHIN THE INTERIOR SHALL HAVE CORNER GUARDS INSTALLED USING STAINLESS STEEL GUARDS.
6. BEHIND ALL TILE PROVIDE CERTAINTED "DIAMONDBACK TILE BACKER TYPE X" SHEATHING OR EQUAL.

GENERAL NOTES

1. INTERIOR WALLS & CEILING TO BE LEVEL 5 FINISH FOR PAINTING. (TYP)
2. SEE INTERIOR ELEVATIONS FOR ADDITIONAL INFORMATION.
3. CONTRACTOR TO PROTECT APPARATUS ROOF FLOOR AND METAL DECK AND PROVIDE PRIMER AND PAINT PER MANF. REQUIREMENTS.
4. CONTRACTOR TO PREPARE STRUCTURAL METAL AND METAL DECK AND PROVIDE PRIMER AND PAINT PER MANF. REQUIREMENTS.
5. CONTRACTOR TO PROVIDE ARCHITECT SAMPLES OF ALL COLORS FOR APPROVAL PER SPECIFICATIONS.
6. ALL CABINETS SHALL BE WOOD INSTITUTE CRITERIA (MJC) PREMIUM GRADE.
 1. THE SIDES, BOTTOMS, AND BACKS ARE TO BE 3/4" EXTERIOR GLUE PLYWOOD. THE DOORS ARE TO BE OF SOLID WOOD. THE TOP IS TO BE 3/4" PLY. AS A BACKING FOR STAINLESS STEEL. COUNTER TOP SHELVES SHALL BE 3/4" EXTERIOR RATED PLY COVERED ON BOTH SIDES WITH LAMINATE, EDGE FACED WITH 1/4" BANDING, AND BE ADJUSTABLE. NO PARTICLE BOARD WITH THE AINTE.
 2. DOORS ARE TO BE INSTALLED WITH 56 ROCKFORD PROCESS CONTROL HINGES, 60 OVERLAY BRUSHED STAINLESS STEEL. FULLS ARE TO BE 56 5/8" FULL TYPE DRAWERS AND FULL-OUT SHELVES ARE TO BE CONSTRUCTED OF BALTIC PLY WITH SELF-CLOSING FULL EXTENSION DRAWER GUIDES.
 3. UNLESS OTHERWISE NOTED, ALL CABINETS EXPOSED SURFACES SHALL BE PLASTIC LAMINATED MATERIAL.

A8.03

**PLANS FOR THE CONSTRUCTION OF
POINT LOMA FIRE STATION NO. 22
FINISH SCHEDULE**

CITY OF SAN DIEGO, CALIFORNIA PUBLIC WORKS DEPARTMENT SHEET 50 OF 113 SHEETS		WBS S-00787
DATE: 01/14/15	BY: JRM	PROJECT MANAGER: MICHAEL MARIA
DESCRIPTION	BY	APPROVED
ORIGINAL	NADEL	12/09/15
REVISIONS	NADEL	12/09/15
REVISIONS	NADEL	12/15/15
PROJECT ENGINEER	204-1083	COORDINATOR
COORDINATOR	204-1082	COORDINATOR
DATE STARTED	DATE COMPLETED	31704-50-D

CONSULTANT

NADEL
NADEL STUDIO ONE INC

4445 EASTGATE MALL
SUITE 407
SAN DIEGO, CA 92121
T. 619.232.8424
F. 619.232.7179
WWW.NADELARC.COM



FINISH SCHEDULE

SCALE: N.T.S. 1

ADDENDUM "C"

POINT LOMA FIRE STATION NO. 22

<p>CABINET W/ ADJ. SHELVES</p> <p>SCALE: 3/4" = 1'-0"</p> <p>13</p>	<p>BASE CABINET</p> <p>SCALE: 1" = 1'-0"</p> <p>9</p>	<p>UPPER CABINET</p> <p>SCALE: 1" = 1'-0"</p> <p>5</p>	<p>ADJUSTABLE SHELF</p> <p>SCALE: 1 1/2" = 1'-0"</p> <p>1</p>
<p>CABINET W/ ADJ. SHELVES</p> <p>SCALE: 3/4" = 1'-0"</p> <p>13</p>	<p>KITCHEN BASE CABINET</p> <p>SCALE: 1" = 1'-0"</p> <p>10</p>	<p>DESK AT DORM</p> <p>SCALE: 1 1/2" = 1'-0"</p> <p>6</p>	<p>ENTRY COUNTER</p> <p>SCALE: 1 1/2" = 1'-0"</p> <p>2</p>
<p>WOOD LOCKERS</p> <p>SCALE: 3/4" = 1'-0"</p> <p>15</p>	<p>LOCKER JAMB AT HASP</p> <p>SCALE: 1/2" = 1'-0"</p> <p>12</p>	<p>CABINET W/ DRAWERS</p> <p>SCALE: 1 1/2" = 1'-0"</p> <p>7</p>	<p>DESK W/ DRAWERS</p> <p>SCALE: 1 1/2" = 1'-0"</p> <p>3</p>
		<p>CONSULTANT</p> <p>NADEL</p> <p>NADEL STUDIO ONE INC</p> <p>4445 EASTGATE MALL SUITE 407 SAN DIEGO, CA 92121 T. 619.232.8424 F. 619.232.7179 WWW.NADELARC.COM</p>	
<p>LOCKER AT HINGE</p> <p>SCALE: 1/2" = 1'-0"</p> <p>8</p>	<p>WOOD TRIM AT DESK</p> <p>SCALE: 3" = 1'-0"</p> <p>4</p>	<p>PLANS FOR THE CONSTRUCTION OF POINT LOMA FIRE STATION NO. 22</p> <p>DETAILS</p> <p>CITY OF SAN DIEGO, CALIFORNIA PUBLIC WORKS DEPARTMENT SHEET 68 OF 113 SHEETS</p> <p>WBS: S-00787</p> <p>PROJECT MANAGER: MICHAEL MARIA</p> <p>PROJECT ENGINEER: 202-1688</p> <p>COST COORDINATOR: 204-1882</p> <p>COORDINATOR: CCSB COORDINATE</p> <p>DATE STARTED: _____ DATE COMPLETED: _____</p> <p>31704-58-D</p>	

A9.08

City of San Diego

CITY CONTACT: LISA NGUYEN, Contract Specialist, Email: LTNguyen@sandiego.gov
Phone No. (619) 533-3435, Fax No. (619) 533-3633

ADDENDUM "B"



FOR



POINT LOMA FIRE STATION NO. 22

BID NO.:	<u>K-16-5414-DBB-3</u>
SAP NO. (WBS/IO/CC):	<u>S-00787</u>
CLIENT DEPARTMENT:	<u>1912</u>
COUNCIL DISTRICT:	<u>2</u>
PROJECT TYPE:	<u>BC</u>

BID DUE DATE:

2:00 PM
DECEMBER 23, 2015
CITY OF SAN DIEGO
PUBLIC WORKS CONTRACTS
1010 SECOND AVENUE, 14th FLOOR, MS 614C
SAN DIEGO, CA 92101

ENGINEER OF WORK

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



1) Registered Engineer/Architect

12/09/2015

Date

Seal:

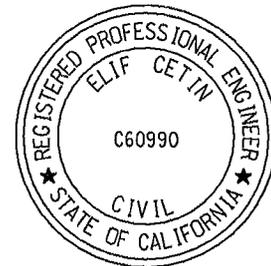


2) For City Engineer

12/09/2015

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. Per sheet S1.0, the slab on grade section is to be placed in accordance with the soils report. However, if the NEW Apparatus room # 101 slab on grade section will be as noted in the soils report, this is the section - (8" Conc. Over 2" Sand and Vapor Barrier Over 4" Medium Coarse Sand or Pea Gravel).

Per the civil drawings the drive area concrete sections are per C-4 Keynote #5. This section is 8" of concrete over 12" Aggregate Base or CTB as noted in the soils report.

Please review and advise if the NEW Apparatus slab section will be per the civil section or as noted per the soils report recommendations for slab on grade?

A1. Per keynote #5 on sheet C-4 driveway area to be 8" concrete over 12" aggregate base. Apparatus slab per structural (Sheet S1.0) with base per soils report.

Q2. Detail 6/S5.0, Type 2 concrete retaining wall schedule (example H = 18'-0") shows "W" as 10' 0". It also shows "B" as 7' 0" and "C" as 3' 0". What "W" does not take into account is the width of the batter walls and the stairs themselves. Please confirm "W" should be "varies" or provide a dimension that includes "B, C" and width of walls and stairs. Please keep in mind that both walls are not the same height. The back wall stays constant and the front wall slopes with the stairs (from +/- 15' retaining to 0' retaining).

The cut through the mid landing of stairs as shown on 2/S5.0, reference detail 12/S5.0 which shows both walls at the same height when they are not the same height. Also Reference 2/AS104 for elevations.

A2. Noted. "W" dimension per wall type 2 under concrete retaining wall schedule (6/S5.0) should say "Varies".

Q3. Keynote 26/A4.01 calls for "Satin Finish". Satin Finish generally means a clear coat. This is not recommended for coastal exposure. We recommend "Clear Anodized" finish. Same basic look but the anodized will hold up under the conditions. Please confirm that "Clear Anodized" finish is required.

A3. Nadel concurs. GC to use clear anodized finish, revised keynote 26/A4.01 & A4.02.

Q4. Elevations 1 & 3/A4.01 show the lettering with some sort of bottom mounting peg. There is no detail or section view that shows this in detail. For letters this size (8" & 12" tall) the standard bottom mount method is by attaching the letter bottoms flush

(no spacer pegs) to a C-channel rail, and then the C-channel rail is mounted to the canopy. Please confirm that this standard bottom mounting method is acceptable.

- A4.** See attached sketch (2/A9.09) for lettering mounting concept.
- Q5.** Spec shows "Eclipse" ceiling tile - also any grid, 15/16" or 9/16". Finish schedule shows Optima Health Zone - 3/4" thick tile. If Health Zone is the correct material, please note Health Zone Optima only comes in 1" thickness. The sizes shown in the kitchen/dining areas will all have to be custom made, is that the intent? - this is significantly more expensive.

A5. Use 9/16" by Eclipse per spec.

- Q6.** On Drawing A2.03 item #10 is the mechanical screen wall. It is shown on A4.01, A7.01 and A7.04. A7.04 item #21 states to provide shop drawings for architect's review and approval.

In order for everyone to have a competitive bid we need to know what material this screen is made of, what size columns and framing, how it is connected to the roof.

Please clarify and provide details on the screen walls.

A6. See response #26 on Addendum A.

Q7. Where does 7 / S 6.0 occur?

A7. It occurs at screen wall located near the above ground fuel tank generator on sheet AS1.00 Also see detail 1/AS1.03.

Q8. Is the "concrete capital" shown in 10 / AS 1.03, precast conc?

What's the color / finish?

A8. Capital to be pre-cast concrete. Paint color to match bldg. or wall.

Q9. Details 1&3/AS1.03 and cuts 7&9/AS1.03 lead you to Structural sheets per note shown on 7/AS1.03. S5.0 Retaining Wall Site Plan only shows the wall shown on detail 1/AS1.03 and not the one on 3/AS1.03. Which is correct?

A9. Both are correct. GC should also refer to details 7&8/S6.0.

Q10. All walls shown are missing Top of Footing call outs and vary few Top of Wall call outs.

A10. GC to field verify final existing conditions for existing retaining walls.

Q11. Cut A-A/C-3 at the Proposed Sand Filter shows what looks like deepened 0" face curb. However there is not a detail showing depth of curb.

A11. GC to refer to Sand Filter Detail B/C-2 for curb heights.

Q12. Window Schedule Sheet A8.02 calls for "FG" (fiberglass windows), however the window spec. section is for aluminum windows. Please advise what type of

windows are desired for this project. If aluminum windows are desired, please issue corrected details. If fiberglass windows are desired, please issue a corrected spec. section.

- A12.** Windows to be aluminum per technical specifications. See revised window schedule sheet A8.02.
- Q13.** Page T-2 call for type 'X' drywall over wood framing for all wall types. Spec. section 09 21 16 calls for air renew M2 tech. type 'X' gypsum board, is this callout for all walls?
- A13.** This call out is for Apparatus Room only. Updated note on wall type schedule, sheet T-2.
- Q14.** Detail 13/a9.09 notes 1/8" high marine edge; this is not possible with 16 ga. Stainless steel, the minimum would be 3/8" high for press brake die clearance. Detail 10/A909 show a 2" return under the counter face which will cause installation issues because of field butt welding (butt welds must be welded on both the tip and undersides or they will crack or break. Recommend a 1" maximum return.
- A14.** GC to use a 1" return.
- Q15.** The marine edge at the end of the peninsula counter (half round radius), would require welding and polishing all 4 marine edge components as it cannot be formed in a press brake or roll formed with the specified metal thickness and would result in excessive warping/oil canning due to welding and polishing heat. Recommend changing the peninsula detail to 3" minimum 45 degree miters.
- A15.** 3" min at 45 degree miter at peninsula is acceptable. Revised island configuration, see sheet detail 1/A6.02.
- Q16.** Where the 4" stainless steel counter backsplash meets the brushed stainless wall cladding detail 11/A9.09 shows a wood nailer and return to the wall noting a 1/4" radius bend. Recommend a 1/2" radius bend per NSF health standards another option for the backsplash is to eliminate the nailer and change the flat vertical splash with a hugger edge tack welded to 18 gauge. Stainless steel wall cladding eliminating the need of a sealant (pre-bid drawing can be provided upon request)
- A16.** Updated detail 11/A9.09 to no longer show 2x wood nailer.
- Q17.** The work table scales to over 120" long and galvanized material isn't usually stocked in 144" lengths, the stretch out before forming would be approximately 132". Recommend using 14 gauge. Stainless steel for this application.
- A17.** 14 gauge. Is acceptable.
- Q18.** Sheet A9.05 details note an aluminum panel system but there are no details for the horizontal to vertical joints or a maximum panel length or material gauge. Recommend fabricating and installing similar to an ACM panel system with no less than .069 5052 material.

- A18.** GC to provide ACM panel system submittal for Architect's final approval.
- Q19.** Drawing page C-4 item #48 calls for new retaining wall and to remove and replace existing fence. Drawing page AS1.00 item #7 calls for a wrought iron fence that is in the same location of item #48 above. Please clarify are we re-installing an existing fence or installing a new wrought iron fence.
- A19.** New fence at both locations. New fence on C-4 #48 to match existing fence height.
- Q20.** Drawing page C-4 item #32 calls for a Gravity Retaining wall per SDRSD C-9.
Drawing page S5.0 detail #2 calls for a "Fence Wall" and points to detail 14/S5.0. Detail 14 is a CMU retaining wall. Please clarify what type of wall is at this location and confirm the top of wall elevation. Please clarify what type of fence will go on the top of the wall.
- A20.** Civil revised keynote no. 32 deferring to structural. "Fence Wall reference on detail 2/S5.0 is incorrect and should say "wall with wrought iron fence". It should also reference detail 13/S5.0.
- Q21.** Per the answer to question #25 in Addendum A, the contractor is directed to install the trash enclosure CMU wall footing per detail 7&8/S6.0. Please determine any rebar requirements for the footing, scab on footing, and counterfort. Please advise if any dowels will be required. Please confirm that the drain shown on 9/AS1.03 will no longer be required due to footing elevation and counterfort conflicts.
- A21.** Per detail 9/AS1.03 drain will be required. GC to provide 4" dia. (min). opening for drain.
- Q22.** Addendum A question 17 for the location of the Verizon generator, please clarify the generator structure (slab, footings, CMU walls) is to be provide by the Verizon Wireless GC or included in this project scope by this GC.
- A22.** GC to include Verizon generator enclosure slab, footing, CMU wall in this scope of work.
- Q23.** Please clarify if the Contractor is to include the PV system what is the requirements for this system.
- A23.** PV panels should occupy as much area as possible within the two parking area as shown in the drawings.
- Q24.** The masonry specs call out split face, gold colored (with red black cinders). The detail says that the walls get stucco on them. Which is it?
- A24.** The drawings govern. Provide stucco to cmu wall. Will revise Spec. section accordingly.
- Q25.** Sheet detail 2/S5.0 shows a CMU retaining wall adjacent to generator area, but not at the trash enclosure. This contradicts all the other plans/details that include a

CMU at that location. Please verify that there is a CMU wall at said trash enclosure location.

- A25.** Detail 2/S5.0 is incomplete. Please refer to details 1 & 3/AS1.03.
- Q26.** Also in that same detail, there is a reference to detail 14/S5.0 at the "Fence Wall" at the NE corner. Is that supposed to say 13/S5.0 "Fence Wall".
- A26.** Detail should be referenced to 13/S5.0 and note should say, "Wall with wrought iron fence".
- Q27.** The temporary site does not show any point of connection for the electrical. Drawing AS1.0 shows item #9 as location of electrical, see electrical for more information. Electrical single line drawings show the panel going to SDG&E.

Clarify SDG&E is providing power to the temporary location of the electrical panel Item #9 on AS1.0. If not please provide the location where we are to pull power from.

- A27.** SDG&E is providing power to the point of connection for the temporary fire station, please see letter and plan from SDG&E in FTP site. Contractor shall coordinate with SDG&E for final location and connection. See the following FTP site: <ftp://ftp.sannet.gov/OUT/ECP/2-15%20TECHNICAL%20STUDIES%20AND%20DATA/>

C. SUPPLEMENTARY SPECIAL PROVISIONS

1. To Attachment E, Technicals, pages 224 through 233, **DELETE** "SECTION 04 22 00, CONCRETE MASONRY UNITS" in its entirety and **SUBSTITUTE** with pages 8 through 16 of this Addendum.

D. PLANS

1. To Drawing numbers 31704-02-D (T-2), 31704-07-D (C-1), 31704-10-D (C-4), 31704-37-D (A4.01), 31704-38-D (A4.02), 31704-42-D (A6.02), 31704-49-D (A8.02), 31704-50-D (A8.03), 31704-59-D (A9.09), **DELETE** in their entirety and **REPLACE** with pages 17 through 25 of this Addendum.

James Nagelvoort, Director
Public Works Department

Dated: *December 9, 2015*
San Diego, California

JN/JB/egz

SECTION 04 22 00 CONCRETE MASONRY UNITS

PART 1 GENERAL

1.1 SUBMITTALS

- A. Samples: If concrete masonry units are to be exposed to view in the final construction, submit samples to Resident Engineer for review prior to constructing job-site mock-ups, delivering materials to Site or commencing Work in this Section.
1. Provide 2 samples of each type and weight classification of concrete masonry units, (stretcher units), to be used on Project showing range of texture and/or color variations of exposed surfaces for units.
 2. Units provided to Project shall match these samples.
- B. Certificates: Submit certification to the Resident Engineer prior to delivery of concrete masonry units to jobsite, signed by Concrete Masonry Unit Manufacturer, stating that the concrete masonry units to be supplied: 1) shall meet the specified requirements for concrete masonry units for exterior building wall construction, and; 2) are suitable for proposed usage.
- C. Test Reports:
1. Submit test results for concrete masonry units for exterior building wall construction to be used to Resident Engineer in accordance with Section 01 45 00.
 2. Test results shall clearly indicate:
 - a. Types of materials and composition.
 - b. Classification of concrete masonry unit in accordance with ASTM C90 requirements.
 - c. Water penetration and leakage in accordance with testing specified under Source Quality Control specified in this section.
 3. Testing laboratory shall notify Resident Engineer of non-conforming material submittals.
- D. Products Form: In accordance with Section 01 33 00, prior to installation in the project, submit a completed products form, Section 00 62 33, for each product which contributes to the points required for LEED™ Certification. Information contained on the Products Forms shall be used to complete the information required for the LEED Submission.

1.2 QUALITY ASSURANCE

- A. Standards: Comply with the requirements of ACI 530.1/ASCE 6 "Specifications for Masonry Structures", except as otherwise indicated.
- B. Regulatory Requirements: Masonry materials and workmanship shall meet requirements of building codes which are applicable to jurisdiction in which Project is located.
- C. Mock-Ups: If concrete masonry units are to be exposed to view in the final construction, prior to start of Work, construct a sample panel from approved materials, containing each different kind or color of concrete masonry units, approximately 4 feet high x 6 feet long or as required to illustrate wall design under direction of Resident Engineer. Sample wall shall not be incorporated into the final work.
1. Sample wall shall provide a standard of workmanship, bond, thickness, tooling of joints and finishes (precision).
 2. Construct successive sample panels until standard is approved.
 3. When accepted, sample wall shall be standard of comparison for remainder of masonry Work.
 4. This sample, when accepted by the Resident Engineer, will function

- as a reference base for acceptance or rejection of final work.
5. Sample wall shall be reviewed by the Resident Engineer for acceptance.
 6. Upon completion of Project, remove sample wall from site and dispose of in a legal manner.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Transport and handle masonry units in such a manner as to prevent chipping and breakage.
- B. Deliver and store materials in dry, protected areas.
- C. Keep free of stain or other damage.
- D. Locate storage piles, pallets, stacks or bins to avoid or protect material from heavy or unnecessary traffic.
- E. Replace damaged material at no cost to Owner.

1.4 PROJECT/SITE CONDITIONS

- A. Hot Weather Requirements:
 1. When ambient air temperature exceeds 100 degrees F., or when ambient air temperature exceeds 90 degrees F. and wind velocity is greater than 8 mph, Masonry Contractor shall implement hot weather protection procedures as submitted to Resident Engineer.
 2. Do not spread mortar beds more than 4 feet ahead of placing block units.
 3. Place block units within one minute of spreading mortar.
- B. Cold Weather Requirements:
 1. Fully protect concrete masonry units against freezing by a weather-tight covering which shall also prevent accumulation of ice.
 2. Do not lay concrete masonry units when temperature of surrounding atmosphere is below 40 degrees F. or is likely to fall below 40 degrees F. in the 24 hour period after laying, unless adequate protection is provided.
- C. Field Measurements:
 1. Verify measurements shown on Drawings by taking field measurements.
 2. Proper fit and attachment of concrete masonry units is required.

1.5 SCHEDULING AND SEQUENCING

- A. Coordination: Coordinate with other Trades whose Work relates to concrete masonry unit installation for placing required blocking, backing, furring, conduits and other items.

PART 2 PRODUCTS

2.1 MATERIALS

- A. General Requirements for Concrete Masonry Units:
 1. CMU shall comply with the requirements of the Structural Notes on the structural drawings.
 2. Concrete masonry units shall meet ASTM C90 requirements except that when CMU will be exposed in final construction, ASTM C90 shall be modified to

read: "Three percent of a shipment containing chips not larger than 1/2 inch in any dimension, or cracks not wider than 0.02 in. and not longer than 10% of the nominal height of the unit is permitted." Linear shrinkage of units of units shall not exceed 0.065 percent.

3. Units shall be in the same condition in wall as they were upon delivery.
4. Unit sizes shall be as shown on Drawings.
5. Texture and color shall be consistent for all units provided for exposed walls. Range of texture and color shall be within that shown by samples and mockups reviewed by Resident Engineer.
 - a. Color: Exposed faces of CMU to be Precision, Natural with cinders with appropriate recycled content for both building and fencing.
6. Surface of units shall be clean and free from dirt when laid in walls.
7. Units not complying with the appropriate ASTM Standards shall not be laid in the wall where exposed to view. Any unit that is chipped in excess of the requirements will be rejected and shall be removed and replaced.
8. Provide special block sizes and shapes required or as shown on Drawings.
9. CMU may be used for construction of building walls exposed to the exterior if they comply with requirements specified under Source Quality Control.
10. Provide units of uniform color and appearance where the completed CMU wall is indicated to be provided with water repellent specified in Section 07 19 00 or which will receive anti-graffiti coatings as specified in Section 09 96 23.
11. Provide recycled materials in accordance with Recycled Content provisions of Section 01 60 00.
12. Provide local/regional materials in accordance with Local/Regional Materials provisions of Section 01 60 00.

B. Hollow CMU Classifications: The following requirements shall apply to all shapes, colors, textures and sizes of CMU provided.

1. Lightweight units:
 - a. Weighing less than 105 lbs. per cubic foot and manufactured from volcanic scoria aggregate per ASTM C331.
 - b. These units shall not be used for exterior construction exposed to weather unless they comply with the requirements specified under Source Quality Control, and if they receive a water repellent coating as specified in Section 07 19 00 (when approved by water repellent manufacturer).
2. Medium weight units:
 - a. Weighing 105 lbs. per cubic foot to less than 125 lbs. per cubic foot and manufactured from a combination of volcanic scoria aggregate conforming to ASTM C331 and sand conforming to ASTM C33.
 - b. These units may be used for exterior construction in an exposed condition:
 - 1) If they comply with the requirements specified under Source Quality Control
 - 2) If they receive a water repellent coating as specified in Section 07 19 00 (when approved by water repellent manufacturer), or; if a finish such as stucco or elastomeric paint will be applied or using an integral water repellent (when approved by integral water repellent manufacturer).
2. Normal weight units:
 - a. Weighing 125 lbs. per cubic foot or more and manufactured with sand conforming to ASTM C33.
 - b. These units may be used for exterior construction in an exposed condition:
 - 1) If they comply with the requirements specified under Source Quality Control
 - 2) If they receive a water repellent coating as specified in

Section 07 19 00 (when approved by water repellent manufacturer), or; if a finish such as stucco or elastomeric paint will be applied or using an integral water repellent (when approved by integral water repellent manufacturer).

- B. Accessory Units: Provide units as required for window sills and jambs, doors, control joints, bond beams, lintels, pilaster, caps and other locations as indicated on Drawings with a minimum of block cutting. Accessory units shall match adjacent unit color and texture unless noted otherwise.

2.3 ACCESSORIES

- A. Joint Reinforcing: In accordance with Section 04 05 23 and Structural Notes.
- B. Reinforcing Steel: As specified under Section 03 20 00.
- C. Control Joints:
 - 1. Rubber: Extruded, solid section, ASTM D2000 2AA-805 with a durometer hardness of 70 or 80 when tested per ASTM D2240.
 - 2. Polyvinyl Chloride (PVC): ASTM D2287, Type PVC 654-4 with a durometer hardness of 85 (+5) when tested per ASTM D2240, minimum tensile strength of 1750 psi with minimum 300 percent elongation per ASTM D638, and cold crack brittleness of 50 degrees F per ASTM D746.
 - 3. Sizes and Profiles: As indicated on Drawings.
- D. Mortar and Grout: As specified under Section 04 05 15.
- E. Nailing Strips: See Section 06 10 53 – Miscellaneous Carpentry.
- F. Sheet Metal Flashings: See Section 07 6000. Furnish shapes in accordance with project requirements and NCMA TEK 19-2A, 19-4A and 19-5A.
- G. Steel Lintels: As indicated or scheduled on Structural Drawings.

2.4 SOURCE QUALITY CONTROL

- A. Concrete masonry units to be provided for exterior exposed building wall construction shall be tested by manufacturer using a spray bar test as follows:
 - 1. Testing shall be performed at no additional cost to Owner.
 - 2. Individual concrete masonry units shall be placed on a rack where water is sprayed at a rate of 140 gallons per hour for a minimum of 4 hours.
 - 3. Testing shall be made upon concrete masonry units prior to application of post-applied water repellent.
 - 4. Test results for units regularly manufactured using a standard mix design within the previous 6 months shall be acceptable.
 - 5. Test results shall meet or exceed the following:

Location	Results
Inside front face shell	<20% damp (no running water or sheen)
Center web	Dry
Inside outer web	<10% damp
Inside of back face shell	Dry
Outside of back face shell	Dry

6. Submit test reports as specified herein under "Submittals."

PART 3 EXECUTION

3.1 EXAMINATION

- A. Installer shall examine supporting structure and conditions under which unit masonry is to be installed, and notify Contractor, in writing, conditions detrimental to proper and timely completion of Work. Do not proceed with the installation of unit masonry Work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.
- B. Do not use units with chips, cracks, or other defects which might be visible in the finished Work unless otherwise acceptable to the Resident Engineer.
- C. Do not build on frozen Work; remove and replace unit masonry Work damaged by frost or freezing.
- D. Do not use frozen materials or materials mixed or coated with ice or frost. Do not lower freezing point of mortar by use of admixtures or anti-freeze agents, and do not use calcium chloride in mortar or grout.

3.2 PREPARATION

- A. Protection: Protect sills, ledges, offsets and other projections from dropping of mortar and grout.

3.3 ERECTION, INSTALLATION, APPLICATION

- A. General Requirements for Concrete Masonry Walls:
 1. Workmanship: Concrete masonry units which will be exposed in the finished work shall be treated as an architectural finish and shall be handled carefully to ensure that chippages do not occur during handling and laying. Handling shall be minimized on the jobsite to eliminate chances for chippage.
 2. Lay units in uniform and true courses, level and plumb to height indicated on Drawings.
 3. Lay concrete unit masonry in such a way that cracks are not formed at time unit is placed in wall.
 4. Units shall not be wetted before being used and shall be laid dry.
 5. Adjusting Units:
 - a. Units shall be adjusted to be level, plumb and straightened into final position in wall while mortar is still soft and plastic enough to ensure a good bond.
 - b. Avoid over-plumbing and pounding of corners and jambs to fit stretcher units after they are set in position.
 - c. If position of unit is shifted after mortar has stiffened, or bond is broken or cracks are formed, re-lay unit in new mortar.
 6. Bearings on Walls: Provide 3 courses of solid units or grouted hollow masonry units below steel bearing plates or beams bearing on walls. Extend bearings each side of contact with load as required to properly transfer loads into wall.
 7. Openings: Provide openings in masonry walls where required or indicated. Steel lintels shall be provided unless otherwise noted.
 8. Cutting of masonry: When required, exposed block units shall be cut with a power driven Carborundum or diamond disc blade saw. When using "wet" cutting methods, clean water shall be used on exposed units.

- B. Bonding:
1. Bond pattern shall be regular running bond unless indicated otherwise on the drawings.
 2. Bond shall be plumb throughout face of wall.
- C. Bearing Wall Intersections:
1. Intersecting block bearing walls shall not be tied together in a masonry bond, except at corners.
 2. One wall shall terminate at face of other wall with a control joint at intersection.
 3. Tie intersecting wall together with a metal tie bar, 1/4 inch x 1-1/4 inches x 2'-4" long with a 2 inch right angle bend at each end of bar, spaced vertically at 2 feet on center.
 4. Bends at ends of tie bars shall be embedded in grouted cells.
 5. Rake out vertical joint between intersecting walls to a depth of 3/4 inch after mortar has stiffened.
 6. Provide sealing of control joint as specified in Section 07 92 00.
- D. Non-Bearing Wall Intersections:
1. Tie non-bearing wall together with strips of metal lath or galvanized 1/4 inch mesh hardware cloth placed across joint between 2 walls placed in alternate horizontal block courses.
 2. Rake out vertical joint between intersecting walls to a depth of 3/4 inch after mortar has stiffened.
 3. Provide sealing of control joint as specified in Section 07 92 00.
- E. Joining of Work:
1. Where fresh masonry joins partially set masonry the exposed surface of the set masonry shall be cleaned and lightly wetted so as to obtain the best possible bond.
 2. Remove loose concrete block and mortar.
 3. Stop-off a horizontal run of masonry by racking back 1/2 brick length in each course and, if grout is used, stopping the grout 4 inches back of the rack.
 4. Tothing will not be permitted, except upon written approval of the Resident Engineer.
- F. Mortar Joints:
1. Joints shall be straight, clean and a uniform 3/8 inch thickness on exposed wall face and in accordance with NCMA TEK 19-2A.
 2. Exposed vertical and horizontal joints shall be tooled when mortar is "thumbprint" hard with round or other approved jointer, slightly larger than the width of the joints to produce a dense, slightly concave or "V" tooled surface (as indicated on Drawings) which is well bonded to block at edges. Raked joints shall not be used on single wythe exterior building wall construction.
 3. Joints shall be tooled flush at:
 - a. Below grade and planter surfaces to receive dampproofing or waterproofing,
 - b. Interior or exterior surfaces to receive ceramic tile, stucco, plaster or other finishes requiring flush joints that are to be concealed.
 4. Solidly fill joints from face of unit to depth of face shell, except where specified otherwise.
 5. Full bedding to be provided for first course on foundation and wherever maximum strength is required.
 6. Butter vertical head joints well and shove these joints tight so that mortar bonds well to both units.
 7. Full coverage to be provided on bed of face shells and webs surrounding cells

- to be filled.
8. Bee-holes or other open joints shall be filled and tooled with mortar while mortar is still fresh.
- G. Control Joints:
1. Provide control joints, as detailed, at vertical masonry walls where such walls exceed 40 feet in length. In long length of walls, provide joints at approximately 24 feet on center or as detailed.
 2. Control joints shall be continuous full height of walls.
 3. At bond beams, control joints shall separate both block and grout; however, steel reinforcing shall be continuous.
 4. Horizontal wire reinforcing shall not run through control joint.
 5. Control joints shall not occur at wall corners, intersections, ends, within 24 inches of concentrated points of bearing or jambs or over openings unless specifically indicated on Structural Drawings.
 6. Control joint materials shall be held back from finished surface as required to allow for sealant and back-up materials.
- H. Horizontal Joint Reinforcing:
1. Place horizontal joint reinforcing every 16 inches vertically throughout wall construction.
 2. Continuously reinforce first bed joint immediately above and below openings. Provide reinforcing in second bed joint above and below openings which extends 2 feet beyond each side of opening.
 3. Lap reinforcement a minimum of 6 inches at splices.
 4. Cut and bend reinforcing at corners.
- I. Vertical Reinforcing and Bond Beam Reinforcing: As indicated on Structural Drawings.
- J. Grouting:
1. Reinforcing steel is to be in place and inspected before grouting starts.
 2. Vertical cells to be filled shall have vertical alignment to maintain a continuous cell area.
 3. Keep cell to be grouted free from mortar.
 4. Fill cells solidly with grout in lifts not to exceed 4 feet.
 5. Grout may be poured by hand bucket, concrete hopper or through a grout pump.
 6. Do not wet down grout space prior to pouring of grout.
 7. Stop pours 1-1/2 inches below top of cell to form a key at pourpoints.
 8. Grout shall be consolidated by mechanical vibration during placing before loss of plasticity in a manner to fill grout space. Grout pours greater than 12 inches shall be reconsolidated by mechanical vibration to minimize voids due to water loss. Grout pours 12 inches or less in height shall be mechanically vibrated, orrodded.
 9. Grout barrier below bond beams shall be continuous wire lath or other approved material.
 10. Grout beams over openings and bond beams in a continuous operation.
 11. Solidly grout in place bolts, anchors and other items within wall construction.
 12. Fully grout jambs and head of metal door frames connected to masonry. Filling of frames shall be done as each 2 feet of masonry is laid.
 13. Use extreme care to prevent grout or mortar from staining face of the masonry.
 14. Immediately remove grout or mortar which is visible on face of masonry.
- K. Provisions for Other Trades and Built-in Items:
1. Build in items required and indicated, including; but not limited to, reinforcing steel, anchors, flashings, sleeves, frames, structural steel, loose lintels, anchor bolts,

- nailling blocks, door and window frames and miscellaneous iron.
- 2. Enclosures for pipes, stacks, ducts and conduits:
 - a. Construct slots, chases, cavities, and similar spaces as required.
 - b. Where masonry is to enclose conduit or piping, bring it to proper level indicated and as directed.
 - c. Cover no pipe, conduit chases or enclosures until advised that Work has been inspected and approved.

L. Tolerances - Standard Level of Quality:

- 1. External corners and other conspicuous lines and levels: +/- 1/2 inch in any 10'-0" section.
- 2. Line of sealant filled movement joints (allowable deviation from specified or indicated): +/- 1/2 inch in any 10'-0" section.
- 3. Actual cross sectional dimension of columns and walls (allowable deviation from specified or indicated): - 3/8 inch, + 3/4 inch.
- 4. Adjacent unit faces in plane (allowable deviation from specified or indicated): +/- 3/16 inch.
- 5. Mortar bed joint thickness (allowable deviation from specified or indicated): - 1/8 inch, +1/4 inch.
- 6. Mortar head joint thickness (allowable deviation from specified or indicated): - 1/4 inch, + 3/8 inch.
- 7. Vertical alignment of the centerline of corresponding head joints in alternate courses when using other than stack bond (allowable deviation from specified or indicated): +/- 5/8 inch.
- 8. Vertical alignment of the centerline of all head joints in a total wall height not to exceed 30'-0" when using other than stack bond (allowable deviation from specified or indicated): +/- 2 inches.
- 9. Vertical alignment of the centerline of all head joints in total wall height not to exceed 30'-0" when using stack bond: (allowable deviation from specified or indicated): +/- one inch.

M. Joint and Crack Control: In accordance with NCMA TEK 10-1.

N. Flashing: In accordance with NCMA TEK 19-2A, 19-4A and 19-5A.and 19-4.

O. Weep holes shall be provided above lintels and vertical obstructions as per manufacturer's flashing and weep hole diagrams.

3.4 FIELD QUALITY CONTROL

- A. Masonry Tests: Inspection and testing of masonry will be performed by a testing laboratory in accordance with Section 01 45 00.
 - 1. Provide free access to Work and cooperate with appointed firm.
 - 2. A set of 3 masonry prisms shall be built and tested in accordance with ASTM C1314 (formerly E447) Method B for each 5,000 square feet of wall area, but not less than one set of 3 masonry prisms for the Project.
 - 3. Water testing of CMU exterior building walls shall be provided as specified in Section 07 19 00.

3.5 ADJUSTING

- A. Pointing of Mortar Joints:
 - 1. Point and fill holes and cracks in exposed mortar joints.
 - 2. Cut out defective mortar joints to a depth of at least 1/4 inch.
 - 3. When cutting is complete, remove dust and loose material by brushing or vacuuming.

4. Prehydrate mortar for pointing by mixing dry ingredients with only sufficient water to produce a damp mass of such consistency that it will retain its form when it is pressed into a ball with hands, but will not flow under trowel.
 5. Allow mortar to stand for a period of not less than one hour nor more than 2 hours, after which remix with addition of sufficient water to produce satisfactory workability.
 6. Pointing mortars shall be identical to adjacent mortar in similar joints and finish results shall match and be indistinguishable from original mortar used.
 7. Premoisten joint and apply mortar tightly.
 8. Tool to match adjacent joints.
 9. Moist cure for 72 hours.
- B. Patching: If approved by Resident Engineer, patching of exposed masonry walls shall be done at conclusion of general Work and shall conform as closely as possible to similar surrounding or adjoining Work.

3.6 CLEANING

- A. Daily Cleaning: Keep walls clean. Soiled masonry from mortar and grout spills which will be exposed to view at completion of Project shall be cleaned immediately with stiff fiber brushes until wall is free of dropped or spattered mortar.
- B. Remove scaffolding and equipment used in Work.
- C. Clean up debris, refuse and surplus material and remove from premises.
- D. Construction Waste: In accordance with Section 01 74 19.
- E. Storm Water Control: In accordance with Greenbook/Whitebook requirements, Section 7- 8.6.
- F. Environment Protection: In accordance with Greenbook/Whitebook requirements, Section 7-8.6.

3.7 PROTECTION

- A. Furnish temporary protection for exposed masonry corners subject to injury.
- B. Carefully cover tops of walls left incomplete at conclusion of day's Work with tarpaulins or other approved covering.
- C. In hot and dry weather, protect masonry against too rapid drying.
- D. Protect finished Work against freezing for a period of not less than 48 hours by means of enclosures, artificial heat, or such other protective methods as may be required.

END OF SECTION

GA GALVANIZED
 GB GRAB BAR
 GFI GROUND FAULT INTERRUPTION
 GI GALVANIZED STEEL
 GL GLASS
 GND GROUND
 GR GRADE
 GWB GYPSUM WALL BOARD
 GYP GYPSUM
 HB HOSE BIB
 HC HOLLOW CORE
 HDBD HARD BOARD
 HDR HEADER
 HDWD HARDWOOD
 HDWR HARDWARE
 HM HOLLOW METAL
 HORIZ HORIZONTAL
 HR HOUR
 HSB HIGH STRENGTH BOLT
 HT,HGT HEIGHT
 HVAC HEATING/VENTILATING/
 AIR CONDITIONING
 HW HOT WATER
 ID INSIDE DIMENSION
 ID INSIDE DIAMETER
 INCL INCLUDE(D), (ING)
 INSUL INSULATION (ING) (ED)
 INT,INTER INTERIOR
 INV INVERTED
 JAN JANITOR
 JST JOIST
 JT JOINT

UNO UNLESS NOTED OTHERWISE
 U, UR URINAL
 V VOLT
 VAC VACUUM, VOLTS A.C.
 VCT VINYL COMPOSITION TILE
 VERT VERTICAL
 VEST VESTIBULE
 VG VERTICAL GRAIN
 VTR VENT TO ROOF
 WVC VINYL WALL COVERING
 W WEST
 W/ WITH
 WC WATER CLOSET
 WD WOOD
 WDW WINDOW
 WF WIDE FLANGE
 WH WATER HEATER
 WI WROUGHT IRON
 W/O WITHOUT
 WP WATERPROOF(ING)
 WSCOT WAINSCOT
 WT WEIGHT
 WUF WELDED WIRE FABRIC
 X-STR EXTRA STRONG
 XX-STR DOUBLE EXTRA STRONG

RECOMMENDED THAT CONTRACTOR SHALL BE RESPONSIBLE FOR FOLLOWING MATERIALS AND QUALITY (EQ) CREDITS VIA APPLICABLE DATA SHEETS. LEED ACCREDITED PROFESSIONAL PRECONSTRUCTION MEETING

MR2.1-2.2: CONSTRUCTION
 MR4.1-4.2: RECYCLED CONTENT
 MR5.1-5.2: REGIONAL MATERIALS
 MR6: RAPIDLY RECYCLED
 MRT: CERTIFIED WOOD
 EQ3.1: INDOOR AIR QUALITY
 CONSTRUCTION
 EQ3.2: INDOOR AIR QUALITY
 OCCUPANCY
 EQ4.3-4.4: LOW-EMITTING

UNDER SPECIAL PERMIT

1. DEMOLISH EXISTING FIRE ALARMS
2. GRADING.
3. SIDEWALK AND (1) NEW SIDEWALK
4. A NEW UL APPROVED GENERATOR AND A DIESEL FUELED GENERATOR WITH A CAPACITY OF MORE THAN 50 BHP.
5. ANY/ALL CELLULAR AND STRUCTURAL REPAIRS WILL BE NOT BE PART OF THIS PERMIT. SEPARATE PERMIT.
6. INSTALLATION OF GENERATOR AND RELATED MECHANICAL

UNLESS SPECIFICALLY CALLED OUT IN THE "SCHEDULE OF WORK", CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ITEMS UNDER SEPARATE PERMIT.

JONATHAN
(My License)

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 CONTROL PERMIT COUNTER, 3RD FLOOR, BOOTH 22, BUILDING CONSTRUCTION AND SAFETY DIVISION, DEVELOPMENT SERVICES CENTER, 1222 FIRST AVENUE, SAN DIEGO (619-446-5150). CONTRACTOR SHALL OBTAIN A TRAFFIC CONTROL PERMIT A MINIMUM OF TWO (2) WORKING DAYS PRIOR TO STARTING WORK, AND A MINIMUM OF FIVE (5) DAYS IF WORK WILL AFFECT A BUS STOP OR AN EXISTING TRAFFIC SIGNAL, OR IF WORK WILL REQUIRE A ROAD OR ALLEY CLOSURE.

CONTRACTOR'S NOTE: CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; AND THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS. CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD CITY OF SAN DIEGO HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF CITY OF SAN DIEGO PERSONNEL.

ENGINEER'S NOTE: THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES & USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

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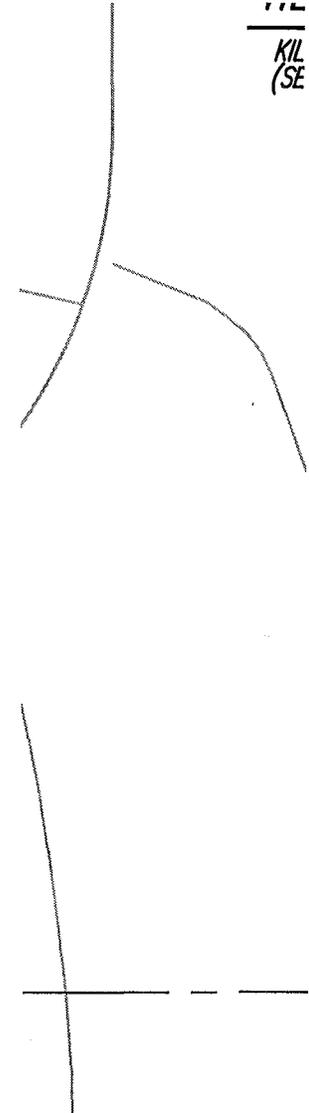
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STREET I

CATALINA

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DATE: 12/8/2015 5:49:08 PM BY: NICK SORCE

(39)	RE-STRIPE TO MATCH EXISTING	
(40)	0" CURB PER SDG-151	(G) (C-3)
(41)	PROTECT EX. RETAINING WALL, CURB, SIDEWALK AND PAVEMENT IN PLACE CONTRACTOR TO REPLACE ANY DAMAGED AREAS IN KIND OR BETTER	
(42)	SCHEDULE J PAVING PER SDG-113	
(48)	NEW RETAINING WALL, CONTRACTOR SHALL REMOVE AND REPLACE FENCE AS REQUIRED FOR CONSTRUCTION OF PROPOSED IMPROVEMENTS	
(49)	2" COPPER WATER SERVICE PER	
(50)	4" SDR-35 SWR LATERAL PER SP-01 AND SP-02	
(51)	4" WET TAP FOR FIRE SERVICE W/ THRUST BLOCK AND GATE VALVE	
(52)	POT HOLE EX. SWR LAT PRIOR TO ANY UNDERGROUND UTILITY CONSTRUCTION AND NOTIFY ENGINEER OF WORK OF ACTUAL IE'S FOR DESIGN CONFIRMATION	
(53)	CONTRACTOR SHALL COORDINATE THE HORIZONTAL LOCATION AND ELEVATION WITH PLUMBING PLANS PRIOR TO ANY CONSTRUCTION	
(54)	STENCIL OR PLACE TILE PLACARD WITH "NO DUMPING - DRAINS TO OCEAN"	
(55)	MATCH TO EX. PCC CONCRETE SMOOTH TRANSITION	
(56)	END 6" PCC CURB	(L) (C-3)
(57)	4" PCC SIDEWALK W/ NO. 3 REBAR AT 24" O.C. BOTH DIRECTIONS SEE ARCHITECTURAL PLANS FOR FINISHES AND JOINTS	
(58)	CONSTRUCT 6" SEWER LATERAL PER SDS-105 CONSTRUCT NEW SADDLE AND SEWER MAIN	
(59)	CONSTRUCT PROTECTIVE BOLLARD PER ARCHITECTS PLAN	
(61)	PCC DRIVEWAY PAVEMENT PER SDG-159	
(62)	1.0'x1.0' BROOKS BOX (OR EQUIVALENT PRECAST BOX)	(N) (C-3)
(63)	BROOKS BOX (OR EQUIVALENT PRECAST BOX) WITH DEEP CONNECTION	(O) (C-3)



THE CROSS SLOPE OF ANY EXCEED 1.5% AND THE DIRL WALKWAYS SHALL NOT EXC.

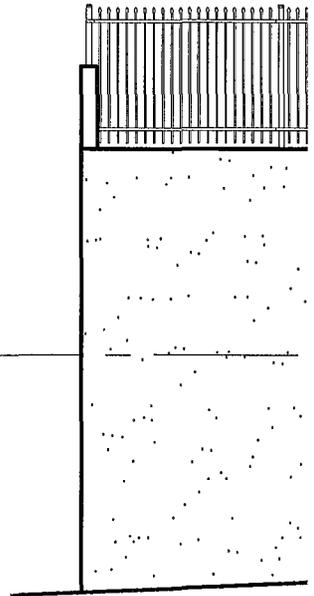
THE SLOPE OF CURB RAMP MAIN RAMP IS NOT TO EXCL LANDING BEYOND THE RAMP

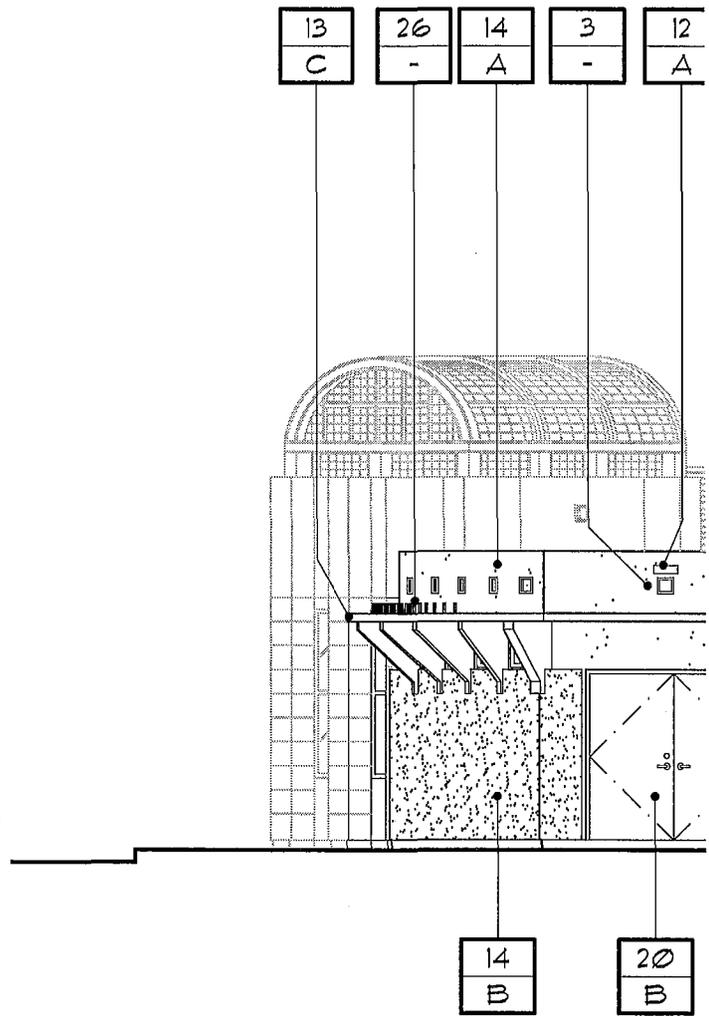
CONTRACTOR IS TO INSURE SHALL INCORPORATE WARN. THE CURBS SHALL COMPLY

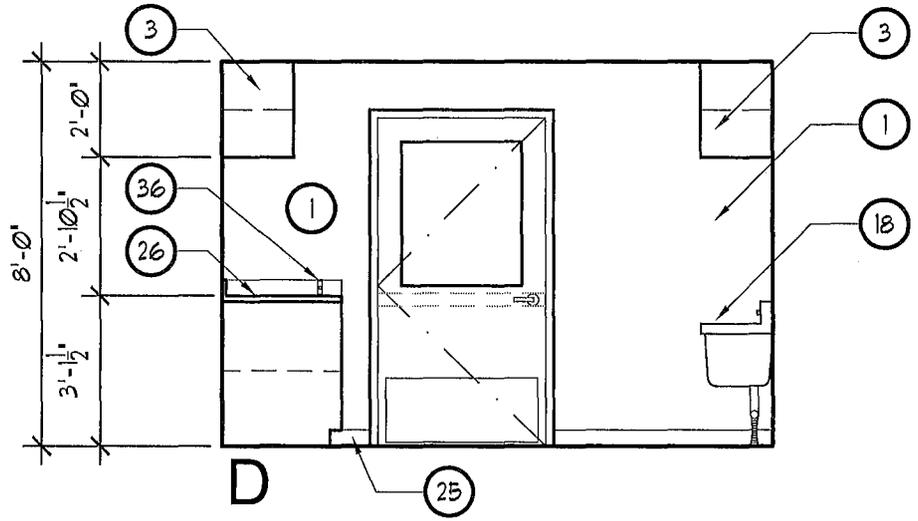
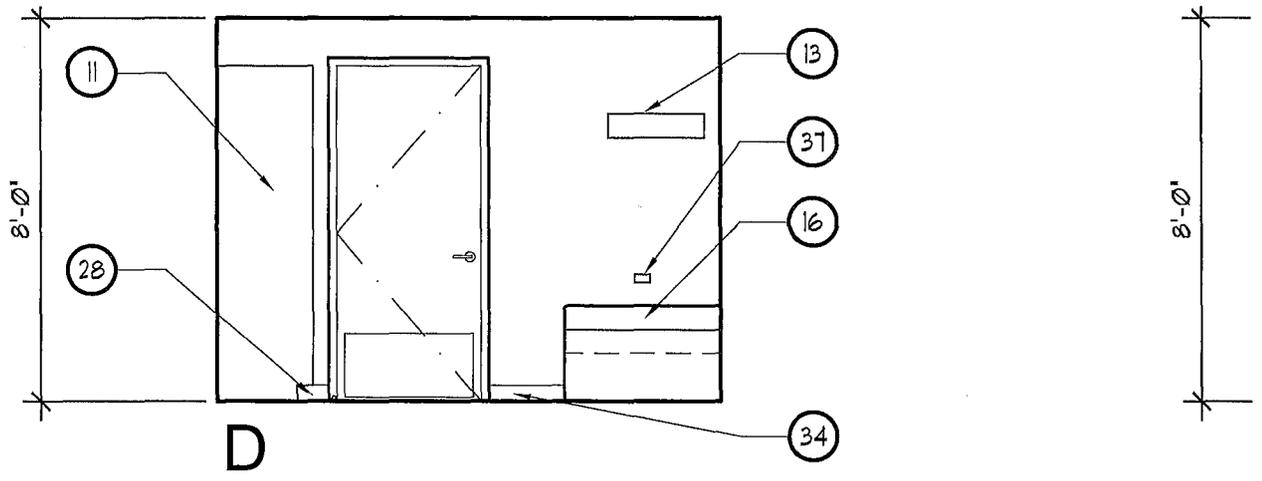
THE CITY OF SAN DIEGO P. DEPARTMENT, AND WATER COORDINATE THE FINAL LG WALLS WITH RESPECT TO L THE PROPOSED REDEVELOP BE PRESENTED TO THE DE HOWEVER THE DESIGN TEA. ANY CONFLICTS OR ENCRG AND DEPARTMENTAL PROA

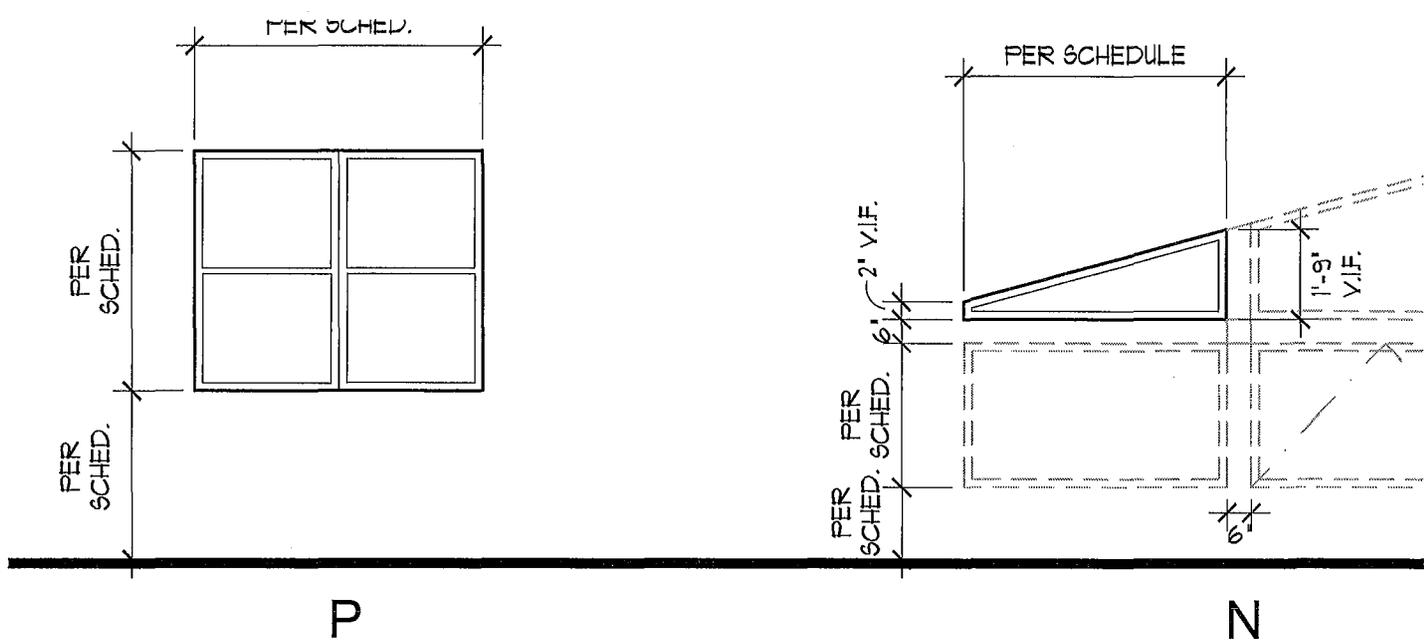
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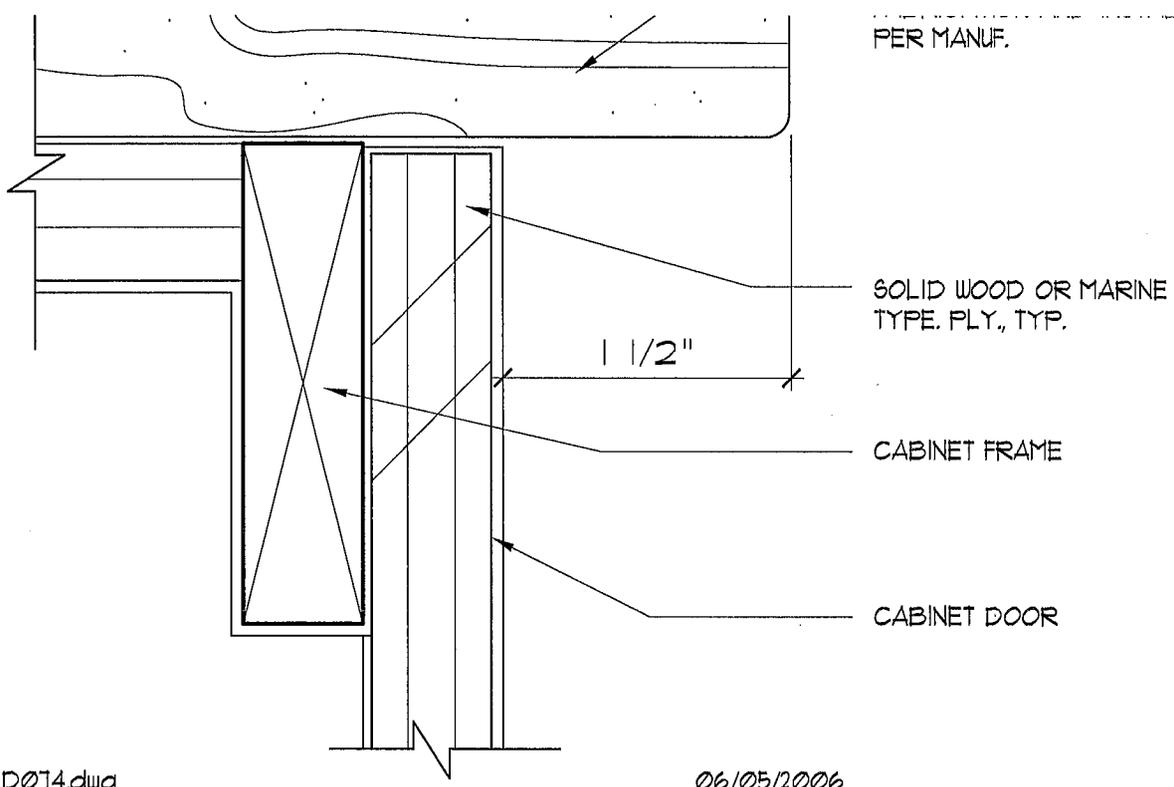


WINDOW SCHEDULE ABBREVIATIONS:

- | | | | |
|--------|------------------|----|----------------|
| ALUM. | ALUMINUM | T. | TEMPERED GLASS |
| F.G. | FIBERGLASS | | |
| F.F. | FACTORY FINISH | | |
| MANUF. | PER MANUFACTURER | | |
| N.R. | NON RATED | | |

WINDOW TYPES

SCAL
1/4"=1



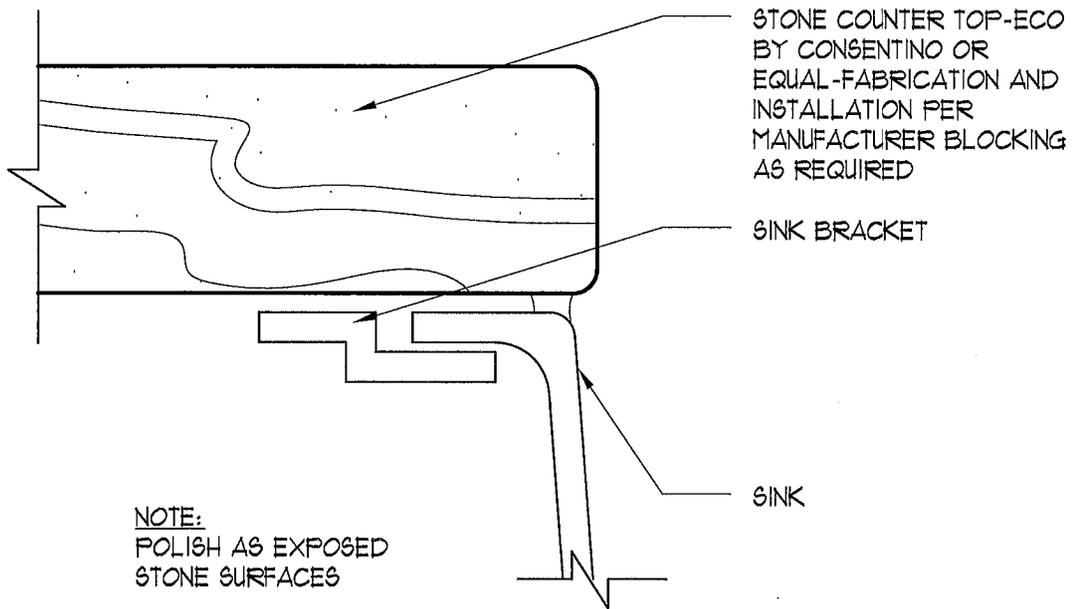
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06/05/2006

STONE COUNTER EDGE

SCALE
FULL

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06/05/2006

STONE COUNTER EDGE

SCALE
1'-0" = 1'-0"

15

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 Engineer/Architect

11-23-2015

Date

Seal:




2) For City Engineer

11-23-2015

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. We would like to bid on the flagpole and need the height and the drawing if possible.
- A1. The site plan (AS1.0) calls for existing flag pole to be refurbished and relocated. Flagpole not to exceed 30 feet in height per SDFRD Fire Stations & Facilities Design & Construction Standards (dated Oct. 23, 2013).
- Q2. Will the City be issuing a separate RFP for moving services or will that go through the bidding General Contractor.
- A2. No, that will go thru the GC since the technical specifications provide an allowance for FF&E under the "Measurement and Payment" division 01-02-50-3, Bid Item #7 & 16.
- Q3. Bid Item #5 is a lump sum price for SDG&E, Pack Bell, AT&T, and Time Warner fees. This item should be an allowance as SDG&E does not have a fee figured out for this project yet. The General Contractor can't guess what SDG&E might do or any other utility company. Please confirm this item will be an allowance for these unknown items.
- A3. This item will be paid as an allowance per amended bid-list.
- Q4. Bid Item #13 for SDG&E fees is the same as above and needs to be an allowance to cover this unknown amount. Please clarify this item will be an allowance.
- A4. This item will be paid as an allowance per amended bid-list.
- Q5. Bid Item #7 for FF & E at Temporary Fire Station. There is no spec section for FF & E on this project. This item should be an allowance or defined so it can be quantified and priced. Please clarify the FF & E line item.
- A5. This item will be paid as an allowance per amended bid-list.
- Q6. Bid Item #16 for FF & E needs to be an allowance because it is not defined in the specifications. Please clarify this item.
- A6. This item will be paid as an allowance per amended bid-list.
- Q7. Please provide the existing elevation of sewer main for our POC in Catalina Blvd.
- A7. Existing sewer main POC is unknown. Downstream MH IE is 8.3' below grade. Approximate elevation of pavement at POC is 58.58. Keynote #52 on sheet C-4 directs contractor to pothole for accurate info.

- Q8. Please provide the size and type of materials for the existing sewer and water mains at the POC's in Catalina Blvd.
- A8. Size of existing sewer main at POC is 8", material is PVC per as-built 20723-4-D. Size of existing Water Main at POC is 16", material is CMCS (Cement Mortar lined and Coated Steel) per as-built 31054-22-D.
- Q9. Spec section 015000 Temporary Facilities and Controls, section 1.17.A Provide temporary surface parking areas to accommodate construction personnel. Please clarify where parking will be allowed and where it will not be allowed.
- A9. Construction crew to utilize street parking along Catalina Boulevard. Any additional crew parking to be coordinated and approved by Public Works.
- Q10. Please clarify the laydown area and an area for construction trailer/office.
- A10. It is the contractor's responsibility to determine storage and staging area(s) per, 2012 Whitebook, section 7-10.7.2, "Storage and Staging areas". Per technical specifications, section 1.3 – Measurement and Payment, Bid Item 1 & 2 requires contractor to be responsible for any mobilization and demobilization required activities.
- Q11. Several places in the specifications it points out to "see Volume 1 - Special Provisions". There is a "Supplementary Special Provisions, Appendices" but no Volume 1 - Special Provisions. Please clarify these references to a Volume 1 - Special Provisions.
- A11. Contractor to refer to Attachment E – Supplementary Special Provisions, Appendices.
- Q12. At the job walk it was mentioned the City would be providing and installing the Trailer/Coach for this project. Drawing page A1.0 of the Temporary Fire Station plans item #2 suggest the Contractor is to provide and install the Coach. Please clarify who is providing and installing the Coach at the temporary site. Please clarify who is removing the coach and transporting the coach to the final storage location at the end of the project.
- A12. Per contract documents (sheet T1.0) contractor is responsible for acquiring state approval, furnishing and installing state approved/registered commercial coach at job site. Commercial coach will be relocated to storage site as directed by the fire dept.
- Q13. Confirm and make sure the Sprung Structure you call out for this job, you already own and just requires to be assembled at the new site.
- A13. Contractor to furnish and install sprung structure for Temporary Fire Station No. 22.
- Q14. On sheet M2.01 shows dual 6" connections for fire trucks. The standard Plymovent connections are 5" each. Shall we utilize dual 5" diameter Flex duct on our SBT 20 sliding balancer System into a recommended 8" out to the Plymovent TEV-585. Please clarify the connection sizes and flex diameters.
- A14. Use standard 5" diameter flex ducts and connections for Permanent Fire Station No. 22. For Temporary Fire Station 22, Sheet M2.1 shows a single drop for vehicle connection. 6" is typical for 1000 cfm airflow required. Confirm with manufacturer if 5" is acceptable.

- Q15. Also confirming on sheet M 3.02 vehicle exhaust system fan mounting detail is guidance and we will provide the standard configuration through submittals. Please clarify.
- A15. As noted on detail, mounting detail is provided for guidance only. Plymovent installation requirements shall govern for Permanent Fire Station 22. For Temporary Fire Station 22, mechanical engineer concurs and recommends contractor refer to detail 3/M3.1.
- Q16. We need direction as to which Plymovent system to submit Pneumatic or Magnetic. Then pneumatic will require compressed air connection the magnetic will not. Please see info on both systems. We will require either type magnetic or pneumatic to be chosen for both the temporary and the actual stations. Please clarify these systems for both temporary site and permeate site.
- A16. Plymovent system to be magnetic for permanent Fire Station 22. For Temporary Fire Station 22, magnetic type system shall be provided. See vehicle exhaust note B.6 on sheet M0.1.
- Q17. Drawing page AS1.00 item #18 is "Proposed CMU Generator Enclosure. Detail 1/AS1.03 shows generator on other side of building. Electrical E1.1 shows generator on the lower level and states "By Others". Drawing page S3.0 calls for generator "By Others". Please clarify the City will provide the generator.
- A17. Current location of generator per keynote 18/AS1.00 is correct and is to be provided by Verizon Wireless GC. Generator per detail 1/AS1.03 is in correct locations and is to be furnished and installed per GC.
- Q18. Generator spec calls for an 8 hour run time fuel tank, drawings call for a 48 hour fuel tank. Please clarify.
- A18. Drawings Govern. Run time should be 48 hrs.
- Q19. On AS1.00 item #10 calls for carport with Photovoltaic. Drawing E0.2 shows the PV system as FUTURE. Item #2 on E0.2 states to provide. There are no requirements for the PV system as to size, output, etc. Please clarify the PV system is Future or by the Contractor in this bid. Please clarify if the Contractor is to include the PV system what is the requirements for this system.
- A19. General contractor to furnish and install photovoltaic system in this bid. Sheet E0.2 will be updated to no longer show "future" designation. For photovoltaic system requirements (See C. Clarifications of this Addendum).
- Q20. Is it the intent of the City to use shoring to support the existing building and sidewalk in order to install the footings for the Type 1 retaining wall and stairs between the new building and the lower parking area or will the City allow for removal of the rear sidewalk and slope the cut. Please clarify if shoring will be required.
- A20. This is a means and methods question for the contractor. The RFP for construction of the temporary and permanent fire stations places the geotechnical services and construction inspection services under the contractors contract.

Since the contractors' geotechnical engineer will be observing the grading operations and preparing the final documents will require the change of geotechnical engineer of record during construction to the firm that is performing work.

Therefore, the geotechnical engineer hired by the contractor should determine if a temporary cut slope will have an adequate factor of safety and the existing structure will not be at risk.

Services to evaluate this condition could be performed by Ninyo & Moore as part of the preconstruction work, but was not included in our scope of services and would require authorization by the City for additional professional services.

- Q21. On the temporary site drawings, sheet E3.1 it calls for a 15kw generator. Please clarify this generator is to be a New or a Used unit, and will remain the property of the Contractor when the temporary site is removed.
- A21. Per Fire Rescue, general contractor to furnish and install 2 new generators (1 for temp station and 1 for permanent fire stations). Upon completion of construction for both the temp and permanent fire station, the generator for the temp. station will be retained and stored by Fire Rescue for future use.
- Q22. The temp generator location shown on C-2 is in the location of the foundation and Cast-In-Place walls for grid line A of the new building. Please clarify an alternate location for the temporary generator.
- A22. The current location of temporary generator is located approximately 3'-8" (face of generator to face of wall) from cast-in-place wall along grid line A. See attached updated AS1.0/keynote 11.
- Q23. Key note #5 on AS1.03 for above ground fuel tank (under separate permit). Detail 14/S3.0 states "fuel tank by others". There are no specifications for the fuel tank which would lead you to believe it is provided by the City. Please clarify the fuel tank will be provided and installed by the City. If the contractor is to provide the fuel tank we need model, manufacturer, size, configuration, pump type, electrical requirements, etc.
- A23. See "C. Clarifications" of this Addendum for above ground fuel tank requirements.
- Q24. Detail 3/AS1.03 item #20 points to a screen wall. There are no details as to material, height, openings, mounting, etc. Please provide details for this screen wall.
- A24. Trash enclosure screen wall system per 'Covrit' Screening Systems. Screen walls to be 'Plankwall PVC', gate to be 'Mission' style with 'Cove Top' trim and 'Shallow Hip' caps. Wall/gate mounting per manuf. recommendations and height not to exceed 6'-0" (see attached sheet AS1.03 keynote 20). Mounting per manufacturer's recommendations. Final color to be approved by Architect. Contractor to submit approved equal screening system if not 'Covrit'.
- Q25. Detail 9 on AS1.03 shows a CMU wall and footing and refers you to structural drawings. There are no structural drawings to reference for footing sizes or steel layout. Please provide a detail for this wall and footing.
- A25. See detail 7 & 8/S6.0. CMU wall not to exceed 8'-0" verify final height in field.

Q26. On Drawing A2.03 item #10 is the mechanical screen wall. It is shown on A4.01, A7.01 and A7.04. A7.04 item #21 states to provide shop drawings for architect's review and approval. In order for everyone to have a competitive bid we need to know what material this screen is made of, what size columns and framing, how it is connected to the roof.

Please clarify and provide details on the screen walls.

A26. Mechanical roof screen system per 'Envisor' Screening Systems (also see spec. section 10 82 00). Screen walls to be 'Louvered' vertical system with 'Flat' top trim. Mounting per manufacturer's recommendations. Final color to be approved by Architect. Contractor to submit approved mechanical equal screening system if not 'Envisor'.

C. CLARIFICATIONS

1. For Answer A19, See "PHOTOVOLTAIC SYSTEM" performance requirements included in this Addendum (Pages 9 through 13).
2. For Answer A23, See "ABOVE GROUND TANK", for above ground fuel tank requirements included in this Addendum (Pages 14 through 21).

D. ATTACHMENTS

1. To Attachment E, Supplementary Special Provisions, Section 2 – Scope and Control of Work, page 35, item 2-3.2 Self Performance **DELETE** in its entirety and **SUBSTITUTE** with the following:

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

1. You must perform, with your own organization, Contract work amounting to at least 30% of the base bid alone or base bid and any additive or deductive alternate(s) that together when added or deducted form the basis of award.
 2. The self performance percentage requirement will be waived for contracts when a "B" License is required or allowed.
2. To Attachment E, Supplementary Special Provisions, Item 2-15 Technical Studies and Data, page 38, Sub-item 1, Hazardous Building Materials Survey Point Loma Fire Station No. 22, date June 25, 2015, **DELETE** in its entirety and **SUBSTITUTE** with the following:
 1. Hazardous Building Materials Survey Point Loma Fire Station No. 22, dated November 19, 2015. See FTP site for document:
<ftp://ftp.sannet.gov/OUT/ECP/2-15%20TECHNICAL%20STUDIES%20AND%20DATA/>
 2. To Attachment E, Technicals, Section 01 02 50, Measurement and Payment, pages 69 through 74, **DELETE** in their entirety and **SUBSTITUTE** with pages 22 through 27 of this Addendum.

3. To Attachment E, Technicals, Section 01 11 00, Summary of Work, pages 75 through 78, **DELETE** in their entirety and **SUBSTITUTE** with pages 28 through 30 of this Addendum.
4. To Attachment E, Technicals, Section 01 31 19, Project Meetings, page 84, **DELETE** in its entirety and **SUBSTITUTE** with page 31 of this Addendum.
5. To Attachment E, Technicals, Section 01 33 00, Submittal Procedures, page 86, **DELETE** in its entirety and **SUBSTITUTE** with pages 32 of this Addendum.
6. To Attachment E, Technical Specifications, Section 26 51 00, Interior Lighting, pages 796 through 797, **DELETE** in their entirety and **SUBSTITUTE** with pages 33 through 34 of this Addendum.

E. CERTIFICATES AND FORMS

1. To Bid Items, pages 1026 through 1027, **DELETE** in their entirety and **SUBSTITUTE** with pages 35 through 37 of this Addendum.

F. PLANS

1. To Drawing number 31704-24-D (AS1.03 Site Details), **DELETE** in its entirety and **REPLACE** with page 38 of this Addendum.
2. To Drawing number 31704-82-D (M2.01 Mechanical Floor Plan), **DELETE** in its entirety and **REPLACE** with page 39 of this Addendum.
3. To Drawing number 31704-98-D (EO.2 Single Line Diagram), **DELETE** in its entirety and **REPLACE** with page 40 of this Addendum.

James Nagelvoort, Director
Public Works Department

Dated: *November 25, 2015*
San Diego, California

JN/AJ/egz

Modern Custom Fabrication

Fresno, California

SuperVault MH-D2-750; 750 gal Specification

INSULATED AND PROTECTED ABOVEGROUND FUEL STORAGE TANK with a 4-Hour Fire Rating

The aboveground fuel storage tanks must be listed and labeled to the Multi-Hazard Standard SwRI-95-03 by Southwest Research Institute. A sample copy of the tank's label and certification must be included with your bid. Tank coating must be a high quality epoxy and urethane paint system. The primary and secondary containment must be steel and must be pressure testable. The insulated and protected tank shall also have passed an annulus fluid communication test certified by the listing agency to verify monitor-ability of the secondary containment.

The insulating concrete used in the construction of the protected aboveground storage tank must include cement, aggregate and water. Cementitious slurries that lack aggregate or include foam fillers are not concrete and will not be acceptable. Expanded polystyrene material is not permitted in the fire protected tank assembly due to detrimental effects that would be created by exposure to a petroleum leak or to extreme heat. The protected aboveground storage tank shall consist of a single-wall steel internal tank surrounded by a layer of lightweight insulating concrete providing the tank with a 4-hour fire rating. The insulating concrete shall be protected by an outer steel secondary containment tank.

The primary tank shall be constructed of steel plate not less than 3/16" thick for tanks for 4,000 gallons or less and not less than 1/4" for tanks with a total capacity over 4,000 gallons. For fuel storage tanks the tank fill connections shall be installed inside a spill containment pan with a capacity of not less than 14 gallons. The protected tank assembly shall be constructed with integral concrete-filled steel supports that provide the ability to rigidly anchor the tank to its concrete foundation for resistance to seismic loads. The supports shall be approved for Seismic Zone 4.

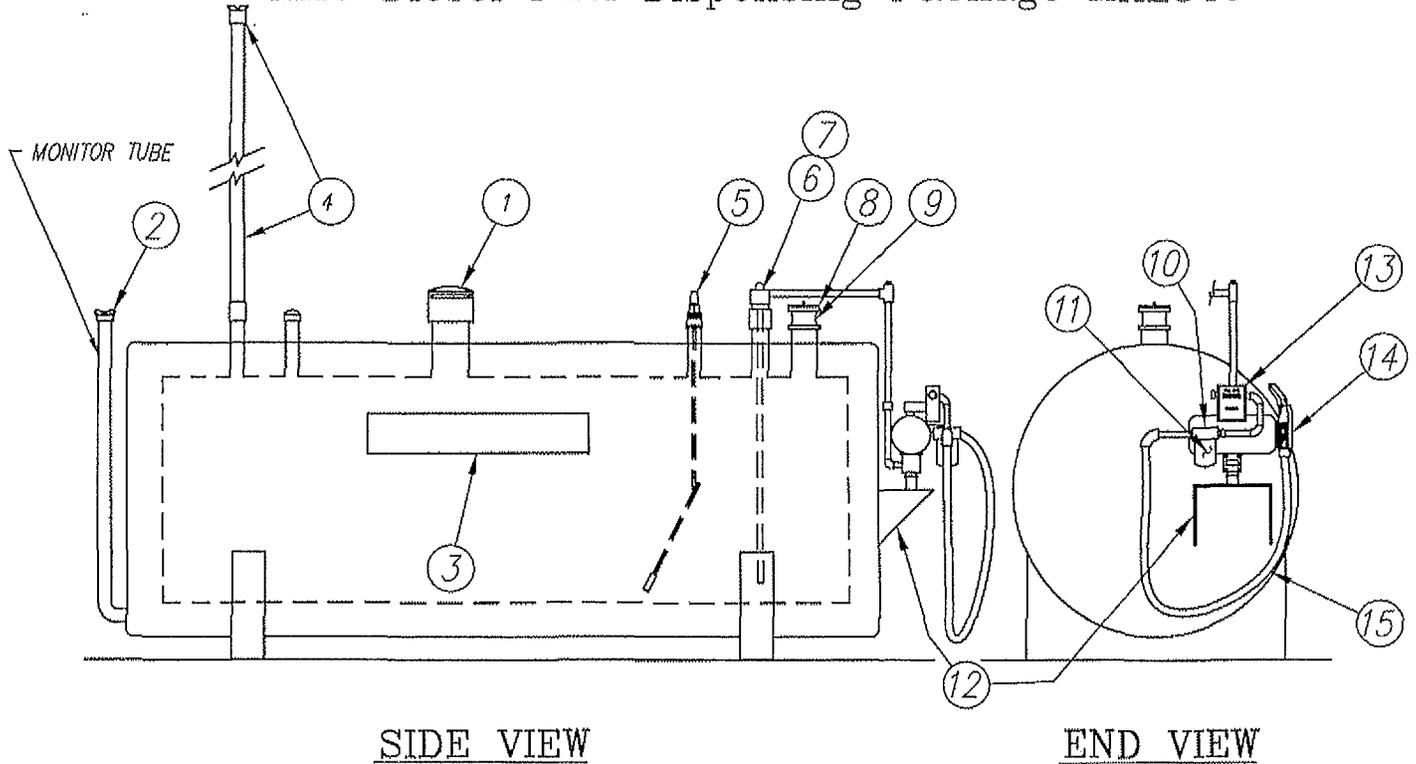
The tank shall carry a label from a nationally recognized independent test laboratory showing approval for UFC Standard A-11-F-1 (formerly known as UFC Standard 79-7) and shall state that the fire, hose stream, ballistics and impact tests were all performed on a single fully assembled test tank.

Acceptable tank is SuperVault MH Model D or equal. If submitting equal you must submit a copy of the tank test results with your bid. These must show the results for the Fire Test, Hose Stream Test, Projectile Penetration Test and Heavy Vehicle Impact Test. No test is exempt all must fall within the guidelines of Uniform Fire Code Test Standard A-11-F-1 (formerly known as UFC Standard 79-7).

Contact: Ron Clويد – (800) 800-TANK (8265)

3/19/12

MHC Diesel Fuel Dispensing Package MHE340



COMPONENT DESCRIPTION

1. EMERGENCY VENT.
2. MONITOR TUBE SAFETY CAP
3. DECAL KIT
4. VENT WITH RISER.
5. LEVEL GAUGE
6. DOUBLE TAP BUSHING WITH SUCTION TUBE
7. ANTI-SIPHON VALVE WITH PRESSURE RELIEF
8. TOP SEAL CAP
9. TOP SEAL ADAPTOR
10. FILTER ADAPTOR
11. FILTER ELEMENT
12. TANK END PUMP MOUNTING ASSEMBLY
13. PUMP WITH METER & HOOK
14. NOZZLE
15. HOSE ASSEMBLY
16. MONITOR TUBE SAFETY CAP
17. MAINTENANCE VALVES

PART NUMBER *

- MORRISON 244M SERIES LS
 MORRISON / 678XA
 TTI / 7.305
 OPW / 23, 2"
 2" GALVANIZED PIPE SCHEDULE 40
 KRUEGER / THERMA-GAUGE, TYPE H-2
 MORRISON 184 SERIES
 SCHEDULE 40 PIPE
 EBW / 616-300-01, 1 1/2"
 OPW / 634-TT-7085, 4"
 OPW / 633-T-8075, 4"
 CIM-TEK / 200H-3-4
 CIM-TEK / 300HS10
 TTI / 7.235
 FILL-RITE FR702
 OPW / 11A (diesel)
 THERMOID / 1481-12, 3/4" x 12'
 MORRISON / 678XA
 3/4" BRASS BALL VALVE

NOTES: 1. THE EQUIPMENT PACKAGE IS INSTALLED WITH ALL PIPING, UNIONS, ELBOWS, TEES AND COUPLINGS SHOWN. PIPING BEYOND THE FITTINGS SHOWN IS THE RESPONSIBILITY OF THE PURCHASER. AN OPTIONAL HOSE RETRACTOR MAY BE ADDED TO THIS SYSTEM.

SUPERVAULT™ MH DIESEL FUEL DISPENSING SYSTEM

*Equipment and Specifications subject to change without notice.

modern custom fabrication
 fresno california

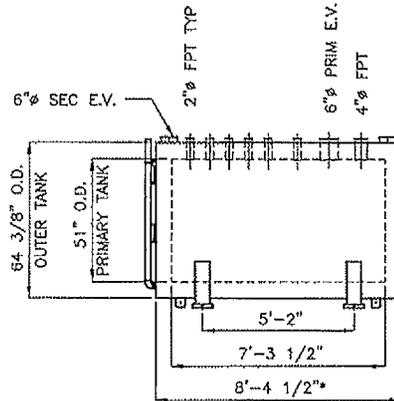


P.O. Box 11925 • 2421 E. California Ave. • Fresno, California 93721
 Ph: (559) 264-4741 OR 800-800-TANK • Fax: (559) 237-3413

SUPERVAULT™ MH MULTI-HAZARD RATED, PROTECTED TANK

DATE :	REVISION No. :	REVISION DATE :	DRAWING NUMBER
4/12/96	2	01/25/05	8.340

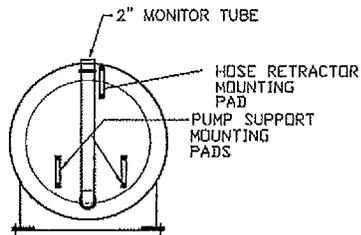
MODEL NO. MHC-D2-750



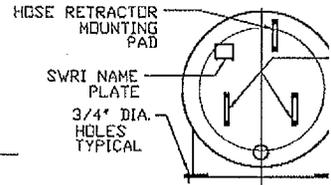
NOTE
ALL FITTING INFORMATION
ON DRAWING NO.
MHC-FTTG

*ADD APPROXIMATELY 9 INCHES TO
TANK LENGTH FOR OVERALL SHIPPING
LENGTH INFORMATION.

ELEVATION VIEW



LEFT END VIEW



RIGHT END VIEW

CUSTOMER APPROVAL: _____

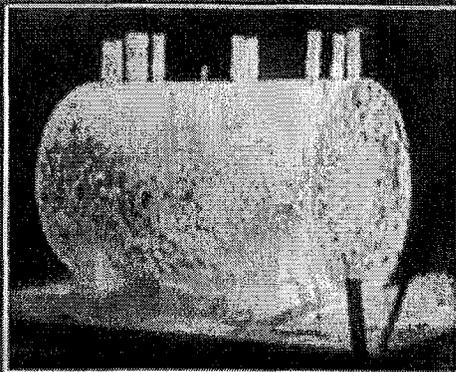
DATE: _____

SHOP ORDER NO.: _____

Specification

SUPERVAULT
PROTECTED ABOVE GROUND

DATE : 2/1/97	REVISION No. : 0	REVISION DATE 2/1/9
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After four hours in a 2000' oven, the SuperVault MH can still pass multiple bullet tests, hose streams (quick chill and erasant) tests, heavy vehicle impact tests, and more fire tests. Average internal temperature rise less than 165° F.

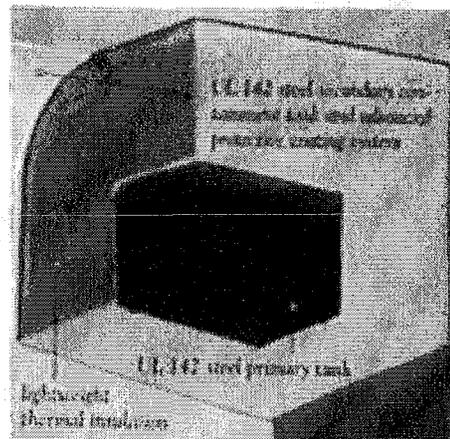
THE FIRST
TANK TO PASS
THE
MULTI-HAZARD
TEST.
IT CAN BE
KEPT IN
SERVICE
WHEN OTHERS
ARE
REPLACED.

The SuperVault MH is the first tank to pass the SWRI 95-03 Multi-Hazard test, the toughest national test for above ground fuel tanks. Most tanks are single-hazard rated which means they can withstand a hazard (fires, bullet impact) one time, but then have to be disposed of carefully. The SuperVault MH has been tested for multiple exposure to fires and other hazards and has passed an extended element exposure test. This means that if the SuperVault MH experiences a hazard, it may be recertified and kept in service rather than having to be replaced. Minimal down time. No tank replacement cost. No disposal cost.

The SuperVault MH. Built to last.

SUPER INSULATION

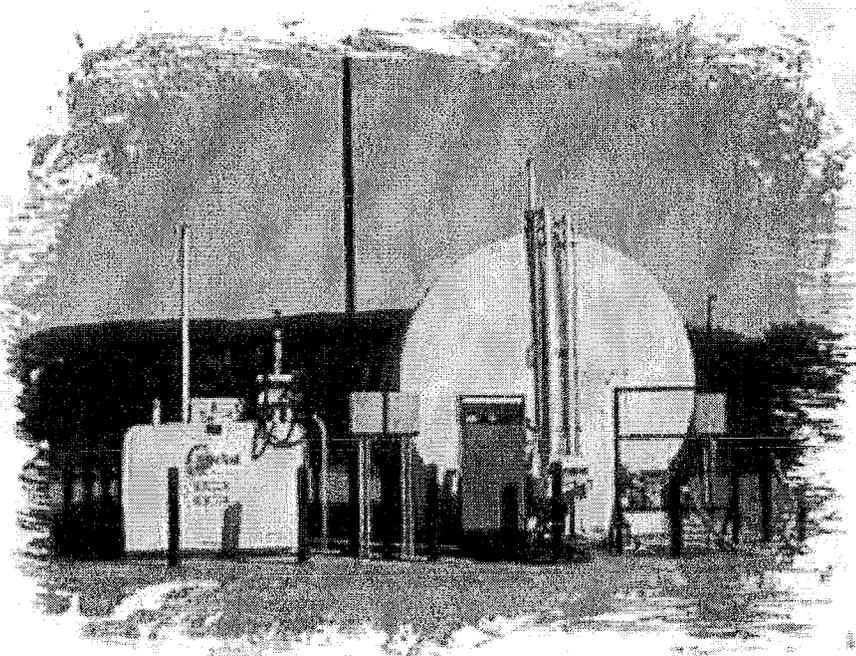
The specially formulated insulation gives maximum thermal protection of the internal steel tank. The special insulation formula also helps guard against corrosion of the steel primary and secondary tanks.



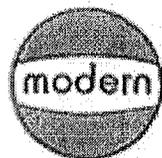
Cut-sectional photo depicting SuperVault MH insulation and construction

TRUE SECONDARY CONTAINMENT

No diking required. New pollution laws made the secondary containment as important as the primary containment. Engineered and constructed for maximum protection, the SuperVault MH outer steel tank provides secondary containment as well as protecting the insulation from wind, sun, rain, snow and fire. The secondary containment tank conforms to UL-142 requirements and can be pressure and vacuum tested in the field.



(800) 800-TANK (8265)



SUPERVAULTMH

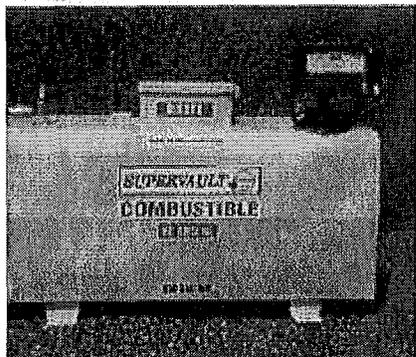
TANK SPECIFICATIONS

Cylindrical sizes from 250 Gallons to 20,000 Gallons

Model Number	Size in Gallons	Overall Length	Overall Height	Overall Width	Approx. Wt.(Lbs.)
MH-D1-250	250	6'3"	4'7"	4'3"	3,700
MH-D1-500	500	10'2"	4'7"	4'3"	5,400
MH-D1-750	750	14'2"	4'7"	4'3"	7,400
MH-D2-500	500	6'3"	5'9"	5'5"	5,100
MH-D2-750	750	8'6"	5'9"	5'5"	6,500
MH-D2-1000	1000	10'11"	5'9"	5'5"	7,800
MH-D2-1500	1500	15'8"	5'9"	5'5"	10,600
MH-D2-2000	2000	20'6"	5'9"	5'5"	13,500
MH-D3-1000	1000	7'4"	6'10"	6'6"	7,600
MH-D3-1500	1500	10'4"	6'10"	6'6"	9,700
MH-D3-2000	2000	13'4"	6'10"	6'6"	12,000
MH-D3-3000	3000	19'3"	6'10"	6'6"	16,400
MH-D3-4000	4000	25'3"	6'10"	6'6"	22,600
MH-D4-2000	2000	8'6"	8'5"	8'1"	12,900
MH-D4-3000	3000	12'1"	8'5"	8'1"	16,700
MH-D4-4000	4000	15'9"	8'5"	8'1"	22,100
MH-D4-5000	5000	19'5"	8'5"	8'1"	26,000
MH-D4-6000	6000	22'10"	8'5"	8'1"	29,400
MH-D4-8000	8000	30'3"	8'5"	8'1"	37,300
MH-D4-10000	10000	37'11"	8'5"	8'1"	44,000
MH-D5-6000	6000	13'4"	11'1"	10'9"	28,800
MH-D5-8000	8000	16'3"	11'1"	10'9"	34,800
MH-D5-10000	10000	20'5"	11'1"	10'9"	41,500
MH-D5-12000	12000	24'0"	11'1"	10'9"	48,000
MH-D5-15000	15000	29'5"	11'1"	10'9"	55,600
MH-D5-20000	20000	38'8"	11'1"	10'9"	69,500

Rectangular sizes from 250 Gallons to 2,000 Gallons

Model Number	Size in Gallons	Overall Length	Overall Height	Overall Width	Approx. Wt.(Lbs.)
MHR-D-250	250	7'1"	3'6"	4'1"	4,150
MHR-D-500	500	6'1"	4'6"	6'0"	5,650
MHR-D-1000	1000	11'1"	4'6"	6'0"	9,250
MHR-D-1500	1500	11'1"	4'6"	8'3"	11,600
MHR-D-2000	2000	11'1"	5'7"	8'3"	12,800



SuperVault MH tanks are available in rectangular and cylindrical styles.



CERTIFICATIONS

- SwRI Multi-Hazard Rating
- Fully listed tank assembly
 - 4-hour Fire Rated
 - SWRI 95-03 & 93-01
 - UFC A-11-F-1 (79-7)
 - UL 2085 Protected Tank, insulated and secondary containment tanks
- Complies with:
 - NFPA 30
 - UFC Crash and bullet resistance
- C.A.R.B. approved

THE SMART CHOICE

- 250 to 20,000 gallons
- 30-year transferable warranty
- Lightweight (low shipping cost)
- Easy to install and relocate
- GSA listed for government jobs
- Protected with a high performance industrial coating system to keep the tank looking great for years

- Reusable after hazard exposure (subject to inspection and recertification)
- Multiple compartment tank configurations available

THE SAFE CHOICE

- Meets standards for storage of new clean fuels
- Secondary containment tank exceeds 110% of primary tank
- No external diking required for secondary containment per UFC
- Optional equipment packages available: gasoline, diesel, ethanol, methanol, jet fuels, lube oils, waste oil, solvents, antifreeze, etc.
- Designed to withstand natural disasters including earthquakes, hurricanes and floods
- Integral supports provide seismic anchoring capability and 4" ground clearance for easy handling

PHOTOVOLTAIC SYSTEM

PART 1 - GENERAL

1.1 GENERAL DESCRIPTION AND REQUIREMENTS

- A. These specifications cover the procurement of equipment, hardware, design, documentation, labor and supervision required for the installation of grid-connected PV system. There will be no energy storage devices (e.g. batteries) used in these systems.
- B. The PV system shall comply with the Expected Performance Based Buydown (EPBB) Program of the California Solar Initiative (CSI).

1.2 DESCRIPTION

- A. All systems should be designed for outdoor Salt-Air, installation in California based on annual ambient temperatures ranging from 25°F to 110°F. Supplied equipment must be rated and warranted to withstand and operate under these conditions.
- B. The PV system will be connected to SDG&E utility electric grid through a grid-interactive power conditioner (inverter). The design and specification of the PV modules, power conditioners, utility interconnections, PV system electrical design, and PV array mechanical design shall meet the requirements of the California Electrical Code, and the California Solar Initiative (as administered by the California Center for Sustainable Energy (CCSE)).
- C. Contractor should be aware of all the documentation and procedural issues required by the Utility Company and City of San Diego prior to submitting their bid.
- D. Contractor shall have been trained in installing grid-connected photovoltaic systems.
- E. The Owner will incorporate required manufacturer's and vendor's drawings into its as-built drawings for its own records.
- F. All drawings shall be prepared in an electronic format that may be imported into AutoCAD drafting software.
- G. The Contractor shall coordinate with the local utility company (SDG&E) including providing interconnection applications and obtaining any permits and inspections.
- H. The PV system shall not be started up without the permission of SDG&E. The contractor shall assist the Owner in obtaining an "Interconnection Agreement" with SDG&E.
- I. The Contractor shall process and coordinate self-generation rebate application with the California Energy Commission (CEC) via the California Center for Sustainable Energy (CCSE)). Application shall be made within 30 days of award of contract and Owner shall be listed as recipient of rebate incentive.
- J. For CSI rebate incentive application the Host and System District shall be indicated as the Owner.

1.3 MAINTENANCE

- A. The Electrical Contractor shall provide a system extended warranty and routine maintenance of 5 years per State of California rebate requirements. Routine maintenance is defined as the act of making sure the PV system operates properly. This includes changing blown fuses, diodes, or other minor equipment and includes any labor required to change out these or other components that fail during the extended warranty.
- B. The Contractor shall conduct a routine maintenance site visit every twelve (12) months for 5 years to make sure the system is operating properly. During this visit, the Contractor shall conduct tests similar to those made during the original system acceptance test. This includes measurements of short-circuit current and open-circuit voltage. This also includes the instantaneous measurement of DC and AC current and voltage while the system is in operation.

1.4 QUALIFICATIONS OF SYSTEM INSTALLER

- A. Submit qualification of system supplier for approval based on the following minimum criteria:
 - 1. Successful experience in at least five comparable installations which have been in operation for a period of not less than three years. Furnish a list of jobs and locations, with contact name and phone number.
 - 2. Maintain a fully staffed and equipped maintenance and repair operation within 90 miles of the job site with the ability to provide emergency restoration service within 24-hours.
 - 3. Employ a NABCEP certified installer who shall supervise the installation work. All installers shall be trained and experienced in PV systems.
 - 4. Meet the criteria for Installer as required by the California Solar Initiative.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Shop Drawings: Provide PV Modules layout and system wiring diagram showing each device and wiring connection required. Submit floor plans showing device locations, conduit and wire size, point-to-point wiring, riser diagrams, etc.
- C. Product Data: Provide electrical characteristics and connection requirements. Provide bill of material, and cut sheets.
- D. Test Reports: Indicate satisfactory completion of required tests and inspections.

PART 2 - PRODUCTS

2.1 QUALITY ASSURANCE

- A. PV Module Manufacturer's Qualifications: The PV module manufacturer of any standard modules shall be a company specializing in the manufacture of PV modules and have at least 5 years of documented experience with their hardware in commercial applications in the field. The PV module manufacturer of any custom modules shall supply documentation detailing their products' field track record for review and approval.

- B. Equipment suppliers shall provide local representation when requested and shall have been actively engaged in the assembly, installation and service of this equipment for a period of not less than 5 years.
- C. Equipment suppliers shall have full parts backup and service availability for this equipment.

2.2 PV MODULE AND ARRAY SPECIFICATIONS

- A. The PV modules shall be framed flat-plate crystalline/poly-crystalline silicon modules. Thin-film modules will not be considered for this project.
- B. The PV arrays shall be sized to achieve a nominal DC and AC power rating as shown in the drawings
- C. The PV modules shall meet or exceed the requirements of Underwriter Laboratories (UL) Standard 1703 Standard for Safety for Flat-Plate Photovoltaic Modules and either IEEE Standard 1262-1995 IEEE Recommended Practice for Qualification of Photovoltaic (PV) Modules and Panels or IEC 1215 Crystalline Silicon Terrestrial Photovoltaic (PV) Modules- Design Qualification and Type Approval.
- D. Each PV module shall be warranted by the manufacturer for at least 90% of its rated power for 10 years and 80% of its rated power for 20 years from the date of system acceptance.
- E. The PV modules' electrical characteristics including current-voltage (I-V) curves and temperature coefficients of module power, voltage, and current shall be characterized by a research laboratory such as the the National Renewable Energy Laboratory or Sandia National Laboratories.
- F. The PV module shall be approved and listed as Eligible Equipment by the California Energy Commission.

2.3 SOURCE CIRCUIT COMBINER BOX SPECIFICATIONS

- A. The PV Array Source Circuit Combiner Box shall meet the following requirements:
 - 1. 600 Vdc rating.
 - 2. 15 series fuses each rated at 15A and 600 Vdc. Total of 12 fuse holders.
 - 3. All fuse holders to be dead front, rated at 600 Vdc, and shall be touch safe.
 - 4. Enclosure to be NEMA 3R or better. Refer to data for this product shown on the drawings.
- B. Each PCS shall be compliant with IEEE Std. 929-2000 (Recommended Practice for Utility Interface of Photovoltaic Systems) and have UL1741 (Standard for Static Inverters and Charge Controllers for Use in Photovoltaic Power Systems). The PCS shall also comply with IEEE Std. 519 (Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems) and the latest applicable ANSI and FCC standards and addenda dated prior to the award of the purchase order for this procurement.
- C. The PCS shall have an automatic visual indicator showing whether the system is on-

line or not, as well as an LCD display of current and total kW production data.

- D. The PCS shall have at least a ten-year warranty as required by the California Solar Initiative.
- E. The PCS and any other required electronics shall have lockable enclosures suitable for outdoor locations.
Enclosures shall be rated as NEMA 3R or better and have superior strength and corrosion resistance properties.
- F. Each PCS shall have a communications port (RS 485) capable for remote monitoring of inverter operation. Provide a data acquisition controller. Provide communication cable terminated within the building in an IDF room. Provide software for receiving and tabulating this information in an IBM- compatible PC with Windows 7 or newer. At a minimum, this information shall include DC voltage and current AC voltage and, current and cumulative Kwh power, and operational status of the PCS.

2.4 POWER CONVERSION SYSTEM (PCS) SPECIFICATIONS

- A. The PCS for the PV system shall be a single DC-to-AC inverter, designed specifically for utility grid interconnection of photovoltaic arrays and be capable of automatic, continuous, unattended operation including start-up, synchronization, and disconnect. The PCS shall be capable of stable operation over the range of voltages, currents, and power levels for the size and type of array used.
- B. The PCS shall be approved and listed as Eligible Equipment by the California Energy Commission.

2.5 METERING

- A. Provide a Data Acquisition Software (DAS) package. The package shall be Fat Spaniel Technologies' Basic Commercial PBI-Compliant Monitoring service package or equal (no known equal) which provides revenue grade monitoring and reporting for 3-phase systems rated at 20kW DC and above.

2.6 PV ARRAY MECHANICAL DESIGN (Deferred Approval)

- A. Shop drawings and engineering calculations of the PV mechanical support system which have been accepted by the Architect shall be submitted to the City of San Diego for approval prior to installation as a deferred approval item.
- B. Installation of PV mechanical support system shall not be started until detailed shop drawings, including all roof and wall anchorage, clips, and racking systems, specifications and engineering calculations bearing the stamp and signature of a structural engineer registered in California have been accepted and signed by the Architect or Structural Engineer in general charge of design and approved by the City of San Diego.
- C. The Contractor shall provide the mechanical hardware for mounting the photovoltaic arrays in accordance with approved shop drawings. The Contractor shall provide all other hardware required for assembling the photovoltaic modules and panels and structurally attaching them to the base support

structure/roof.

- D. The PV array, including modules, hardware and attachments shall be designed to withstand wind loads and comply with all existing local and state codes for Seismic Zone 4 installations.
- E. Tilt-Roof Mount Array:
 - 1. The array design shown on the drawing utilizes PV Module Roof Mounting System. The system shall be comprised of Solar mount Rail sets.
 - 2. The PV-mounting systems shall attach to roof stand-offs as indicated on the architectural and structural drawings and shall be installed and waterproofed as approved by the Architect.
- F. Array mounting hardware supplied by the contractor should be compatible with the site considerations and environment. Special attention should be paid to minimizing the risk from exposed fasteners, sharp edges, and potential damage to the modules or support structure. Corrosion resistance and durability of the mechanical hardware should be emphasized - the use of stainless steel fasteners and an aluminum or galvanized support structure is preferred. The use of ferrous metals, wood or plastic components is strongly discouraged. Galvanic corrosion shall be minimized.
- G. Spacing between individual modules and panels shall be kept to a minimum to maximize space utilization. All mechanical hardware, conduit, junction boxes, wiring and other components shall be concealed beneath/behind the array.
- H. The array layout shall be consistent with the ordering (and labeling) of source circuits in the array combiner boxes. Ease of access for array troubleshooting and maintenance is desired by allowing access to the back of the array for module junction box servicing, and removal/replacement of individual source circuits (panels) and modules if necessary.

PART 3 - EXECUTION

3.1 PV SYSTEM ELECTRICAL DESIGN

- A. The installed PV system shall conform to the 2010 California Electrical Code, Article 690 Solar Photovoltaic Systems, and shall comply with the IEEE Std. 1374-1998 (Guide for Terrestrial Photovoltaic Power System Safety).
- B. All electrical components, including overcurrent protection, disconnect, surge suppression devices, conduit, wiring and terminals must have UL or equivalent listing and have appropriate voltage, current and temperature ratings for the application. Special attention shall be given to appropriate ratings for components used in DC circuits.
- C. All wiring shall be copper and have insulation listed for operation at 600 volts and temperature rating of 90° C in wet locations. Where used on DC circuits the conductors shall be “-2” rated for continuous operation at 90°C. All current carrying conductors shall be enclosed in conduit, including module interconnections. Exception: Where indicated on the drawings, the wiring for module interconnections may be run in Free Air and shall be sunlight resistant.

- D. Voltage drop in array DC source circuits should be limited to no more than 1.5%, including losses in conductors and through all fuses blocking diodes and termination points.
- E. All overcurrent devices shall have trip ratings less than the de-rated ampacity of the conductors that they protect.
- F. All series connected strings of modules (also known as panels, or source circuits) must include a series fuse as required by UL and NEC to protect wiring and other system components. Parallel connections of modules in individual source circuits are not permitted. Parallel-connected cells within individual modules are allowable as long as the module listing allows for the series fuse required for this configuration.
- G. The fuses required in paragraph F, above, shall also serve to prevent reverse currents.
- H. Ground-fault protection devices shall be included as part of the PCS. These devices must be capable of detecting array ground faults, shunting the fault current to ground, and disabling the array until the fault has been cleared.
- I. All terminations shall use listed box terminal or compression type connections. Twist on wire splices, crimped, soldered or taped connections are not permitted for the required field installed wiring. Proper torque specifications should be provided for all of the required field connections.
- J. All module frames, panel/array support structures, metal enclosures, panel boards and the PCS cabinet should be provided with connections for bonding to a common grounding conductor and terminating at the utility service entrance ground. In addition, provisions for grounding the neutral of the PCS output shall be provided. The DC negative circuit may be common to the AC neutral in the PCS design and under no circumstances should multiple connections to ground be specified for current carrying conductors in the system.
- K. System arrangement shall comply with SDG&E requirements. A licensed electrician must make all final connections.
- L. Loss of Line: The PCS shall not operate without the line voltage present. The PCS shall sense a "loss of line" (utility) condition and shall automatically disconnect from the line. In the event of multiple PCSs and/or balanced load on a common line, the PCS shall contain circuits (such as Sandia Voltage Shift and Sandia Frequency Shift) that will cause the PCS voltage or frequency to drift downwards under loss of line conditions and cause it to cease energizing the grid within two seconds after loss of line. The PCS restart shall occur automatically after restoration of line voltage and frequency for at least five minutes.
- M. The PCS shall be capable of completely automatic operation, including "wake-up," "sleep" mode and shutdown after loss of utility power. In the automatic mode, the PCS shall monitor the available PV array power and voltage, and when a predetermined amount of power threshold is available and the array voltage is within the normal starting voltage, the wake-up sequence shall be initiated. The PCS shall monitor the AC line voltage and frequency and, when the AC voltage is within the normal operating range and the frequency is between 59.5 and 60.5 Hz, the synchronization process shall be initiated prior to establishing line-tie. The shutdown sequence to place the PCS in "sleep" mode shall not be initiated above a set value of array power. The DC power source and/or the AC circuit may remain connected in the "sleep" mode to provide monitoring and instrumentation power during nighttime operation.

- N. Contractor shall provide a meter with meter socket type and location to be approved by utility and as required by the California Solar Initiative. See 2.5 above.
- O. Contractor shall provide nameplates:
 - 1. Disconnects:
 - a. Product Description: Engraved three-layered, laminated plastic nameplates, black letters on yellow background.
 - b. Letter size: ¼” and 1/8”.
 - 2. System Component Location:
 - a. Product Description: Engraved three-layered, laminated plastic nameplates, white letters on red background.
 - b. Letter size: 1/8”, ¼”, and ¾”.

3.2 TESTING AND COMMISSIONING

- A. Before start up the PV system shall be tested by the contractor and witnessed by the Owner according to the following test criteria. Results of all inspections, tests, and subsequent corrective action taken or to be taken shall be documented and provided to the Owner.
 - 1. Visual inspection to make sure system is installed to code and in a workmanlike manner. A photo-record shall be made by contractor including the PV array, inverter, isolation transformer, disconnect switches, combiner boxes and connections.
 - 2. Visual inspection of PV array to insure that all PV modules are free from defects, installed properly and are in like new condition.
 - 3. Verify proper wire connections/polarities/phase sequencing to and from all equipment as appropriate.
 - 4. The following parameters shall be measured and recorded on a clear sunny day between the hours of 11:00 am and 1:00 pm.
 - a. Ambient temperature in °C
 - b. Plane of Array Irradiance in kW/m²
 - c. AC line voltage at utility side of isolation transformer
 - d. AC line voltage at inverter side of isolation transformer
 - e. Open-circuit voltage of all source circuits (measured at DC combiner box)
 - f. Short-circuit current of all source circuits (measured at DC combiner box)
 - g. Max-power current of all source circuits (measured at DC combiner box)
 - h. PV array max-power voltage (measured at DC disconnect)
 - i. PV array max-power current (measured at DC disconnect)
 - j. 3-Phase power output measured at utility side of inverter (in kW)
 - 5. Training and start-up: Within one week of approval for interconnection by SDG&E contractor shall start system up and conduct training of select District’s personnel covering the following items:
 - a. Overall system operation

- b. Each major component and discuss its function (PV Array, Combiner box, DC disconnect, inverter, isolation transformer, kWh meter, AC disconnect)
 - c. Start-up procedure
 - d. System operation
 - e. System shutdown procedure
 - f. Inverter error message/codes
 - g. Possible system faults'
 - h. System troubleshooting procedure
6. Performance requirements including:
- a. Minimum Inverter efficiency = 93%
 - b. Maximum allowable wire loss (dc plus ac) = 3%
 - c. Maximum allowable module mismatch = 3%
7. Inverter input/output voltage
- a. Input voltage range = 330 – 600 Vdc
 - b. Output voltage = 3-Phase, 480 Vac, 60 Hz.\

3.3 RELATED DOCUMENTS

- A. Furnish electrical schematics and diagrams showing all major components and devices, including conductor types and sizes, connections of individual modules and array source circuits, terminations at junction boxes, connection to surge suppression devices and the PCS, and the PCS interface with the utility grid.
- B. Furnish complete parts lists, including all electrical components, mechanical hardware and other equipment required for installing the systems (must include description and make for all the equipment provided, model/part number and source are also required for the PV modules and the inverter).
- C. Furnish mechanical drawings showing details of module/array mechanical support.
- D. Furnish complete assembly and installation instructions for mounting array, junction boxes and enclosures, routing conduit, wiring arrays, and terminating conductors at array, combiner boxes and PCS.
- E. Submit procedure for commissioning, operating, disconnecting, servicing and maintaining complete system and individual components.

END OF SECTION

SECTION 01 02 50

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 DESCRIPTION

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

1.2 BID PROPOSAL

- A. **Lump Sum Prices:** The CONTRACTOR shall provide Lump Sum Prices in the Bid Schedule for all WORK in the Contract Documents, except items of WORK listed in the Contract as Unit Priced Items. For Lump Sum items, only the total amount need be filled in.
- B. **Allowance Items:** Allowance Item amounts are provided by the OWNER to cover the cost of additive WORK not presently identified in the Contract Documents. Payment for Allowance Items will be made only when authorized as described in Part 1.3, below.
- C. **Retention:** Payment for all bid items is subject to the retention provisions of the General Conditions.
- D. **Schedule:** All scoped Allowance Bid Items and Unit Priced Bid Items are included in the scope of the Contract without specific locations for the WORK provided. The OWNER reserves the right to direct that these scoped items of WORK be performed when they are encountered, and the CONTRACTOR is obligated to accommodate this WORK within the original contract duration. The CONTRACTOR will not be entitled to additional time regardless of where the WORK is encountered.

- E. **Stipulated or Bid Unit Prices:** When the OWNER'S use of a Unit Price Bid Item exceeds 200% of the Bid Item quantity, the CONTRACTOR or OWNER may demand that the Unit Price Item be renegotiated for quantities in excess of the 200%, whether the price is stipulated or bid. This provision is to prevail over any conflicting general condition provision.
- F. Quantities for each item in the Bid Schedule will be used to analyze the bids and determine contract award.
- G. **Specified Items and Stipulated Prices:** The stipulated price for these items cannot be invoiced until the item is complete and accepted by the RESIDENTENGINEER.

1.3 MEASUREMENT AND PAYMENT

A. **General:** This article defines the manner and method to develop the Lump Sum, Unit Price, and Allowance bid amounts of all items identified in the Bid Schedule. Bid amounts will include all plant, equipment, tools materials, labor, service, and all other items required to complete the WORK included in the Contract unless specifically excluded by this section. WORK required for which no separate bid item is identified will be considered as a subsidiary obligation of the CONTRACTOR, and the cost therefore shall be included in the most applicable bid item. Compensation for completion of the WORK will be determined by use of the cost loaded CPM schedule. Bid amounts for each item will be the basis for development of budget values for activities included in the cost loaded CPM schedule as described in the Contract Documents. Unit Price and Allowance Bid Item amounts will also be adjusted by a Change Order to the contract amount when WORK is completed, and actual authorized quantities and Allowance amounts are established.

B. **Contract-Required WORK
(PHASE 1)**

1. **Bid Item No. 1 - Construction of Temporary Fire Station No. 22 and related site improvements. (Lump Sum):**

Description: The lump sum payment for the Construction of Temporary Fire Station No. 22 located at 1055 Catalina Blvd. and related ("on" and "off") site improvements shall be considered full compensation for furnishing, demolition, constructing and completion of all facilities, mobilization, demobilization, insurance, supervision, planning, design, and engineering fees, complete as defined within these Contract Documents.

2. **Bid Item No. 2 – WPCP – Development – For Temporary Fire Station Best Management Practices as Required by the City of San Diego Land Development Manual Storm Standards of March 24, 2008 Report & Water. (Lump Sum).**

3. **Bid Item No. 3 - WPCP – Implementation – For Temporary Fire Station. (Lump Sum).**

4. **Bid Item No. 4 - Building Permits for Temporary Fire Station: (Allowance) including City of San Diego, Sheet C4 fees, Water & Sewer Capacities and Connection Fees (Reimbursement). Contractor to Include in Project Lump Sum Bid Cost for Mechanical, Plumbing**

Allowance Amount: = \$10,000.00

5. **Bid Item No. 5 - SDG&E Service Fee, Dry Utilities Connections, Pack Bell, AT&T and Time Warner – Temporary Fire Station – Type I. (Allowance).**
6. **Bid Item No. 6 – Bond (Payment and Performance) – Temporary Fire Station. (Lump Sum).**
7. **Bid Item No. 7 – FF & E – Temporary Fire Station. (Allowance).**
8. **Bid Item No. 8 – Field Orders – Temporary Fire Station – Type II. (Allowance).**
Allowance Amount: = \$30,000.00

(PHASE 2)

9. **Bid Item No. 9 - Construction of Permanent Fire Station No. 22 and related site improvements. (Lump Sum):**

Description: The lump sum payment for the Construction of Permanent Fire Station No. 22 located 1055 Catalina Blvd. and related ("on" and "off") site improvements shall be considered full compensation for furnishing, demolition, constructing and completion of all facilities, including but not limited to PhotoVoltaic roof system, mobilization, demobilization, insurance, supervision, planning, design, and engineering fees, complete as defined within these Contract Documents.
10. **Bid Item No. 10 –WPCP – Development – For Permanent Fire Station Best Management Practices as Required by the City of San Diego Land Development Manual Storm Standards of March 24, 2008 Report & Water. (Lump Sum).**
11. **Bid Item No. 11 - WPCP – Implementation – For Permanent Fire Station. (Lump Sum).**
12. **Bid Item No. 12 - Building Permits for Permanent Fire Station for any additional permits. (Allowance)**
Allowance Amount: = \$10,000.00
13. **Bid Item No. 13 – SDGE&E Service Fee, Dry Utilities Connections, Pack Bell, AT&T and Time Warner – Permanent Fire Station – Type I. (Allowance).**
14. **Bid Item No. 14 – Field Orders – Permanent Fire Station – Type II. (Allowance).**
Allowance Amount: = \$200,000.00
15. **Bid Item No. 15 – Bond (Payment and Performance) – Permanent Fire Station. (Lump Sum).**
16. **Bid Item No. 16 – FF & E – Permanent Fire Station. (Allowance).**

17. **Bid Item No. 17 – Remediation of Possible Contaminated Unusable Soil (to Include Preparation of Hazardous Waste Management Plan and Reporting per ‘Whitebook’ Section 803-16a as Determined by GEOCON Site Assessment Report dated July 2000. (Lump Sum).**

PART 2 - PRODUCTS

2.1 GENERAL PROGRESS PAYMENT REQUIREMENTS

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

2.2 APPLICATION FOR PAYMENT

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

- C. The Application for Payment is submitted according to the format and instructions provided by the City and covering the WORK completed through the last day of the previous month or through the date established by the City Representative/RESIDENT ENGINEER.

PART 3 - EXECUTION

3.1 MONTHLY REVIEWS/APPLICATION FOR PAYMENT

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

3.2 PAYMENT FOR PRODUCTS STORED ON SITE

- A. Refer to City Supplement section 9-3.3.1.1.
- B. The CONTRACTOR may request payment for products (material and/or equipment) which will be incorporated into the WORK and which are delivered and stored on-site. Payments for products stored at the site shall be based upon the cost of all acceptable materials and equipment not incorporated in the WORK but delivered and suitably stored at the site; provided each such individual item has a value of more than \$5,000.00 (five thousand) and will become a permanent part of the WORK. The Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that the CONTRACTOR has received the materials and equipment free and clear of all liens, charges, secured interests, and encumbrances and evidence that the materials and equipment are covered by appropriate property insurance as specified in the insurance provisions and other arrangements to protect the City's interest.

3.3 PARTIAL PAYMENTS FOR MATERIALS STORED OFF SITE

- A. Refer to City Supplement section 9-3.3.1.2.
- B. The CONTRACTOR may request partial payment for Products (material and/or equipment), which will be incorporated into the WORK and which are delivered and stored off-site. Any payments approved pursuant to this sub-section shall not exceed sixty-five percent (65%) of the Product's invoiced value and shall be subject to retainage as set forth in the General Conditions. The City reserves the right to refuse approval for payment for any Equipment or Materials suitably stored off-site in its sole discretion, regardless of whether all conditions contained herein have been met.
- C. Partial payment may be made for Products eligible for off-site delivery and storage only upon presentation by the CONTRACTOR of a Bill of Sale, an Invoice or an Affidavit certifying that the material is received by the CONTRACTOR free and clear of all liens, encumbrances and secured interests of any kind, and including, for off-site delivery, evidence acceptable to the City that "all-risks" property insurance in an amount sufficient to protect the interests of the City is in effect at the approved site, and that the City is a loss payee and an additional insured.

- D. Partial payment for Products delivered and stored off-site shall be contingent upon CONTRACTOR'S compliance with the storage and protective maintenance requirements set forth in the Contract Document provisions and all other requirements necessary to preserve equipment warranties for the benefit of the City.
- E. All costs associated with delivery to and storage at an off-site facility shall be assumed by the CONTRACTOR notwithstanding the CONTRACTOR'S request for and the obtaining from the City approval to so deliver and store the materials.
- F. CONTRACTOR shall provide written evidence to the City of having made arrangements for unrestricted access by the City and its authorized representatives to the materials wherever stored, including provision for the City to take control and possession of such materials at any time and without restriction.
- G. CONTRACTOR must provide the City, upon request and prior to any partial payment, documentation which transfers absolute legal title to such materials to the City conditional only upon receipt of final payment. Neither such transfer of title nor any partial payment shall constitute acceptance by the City of the materials, nor void the right to reject materials subsequently found to be unsatisfactory, or in any way relieve the CONTRACTOR of any obligation arising under the Contract Documents.

END OF SECTION

SECTION 01 11 00

SUMMARY OF WORK

1.1 WORK COVERED BY CONTRACT DOCUMENTS

- A. The summary of the scope of work includes demolition of the existing Fire station located at 1055 Catalina Blvd., San Diego, CA, 92107 and the construction of a (6,180 SF) new Permanent station at the same site location. The scope also includes assembling a temporary facility (located within same site and over future permanent staff parking lot), which consist of a (sprung structure and state approved trailer/coach with related site improvements) to accommodate the fire crew until the construction of the new Permanent station is completed. Once the new Permanent station is completed the fire fighters can move into the new facility. In addition to the scope of work, the temporary sprung structure and the trailer/coach to be moved to a storage within 30 miles radius from the no longer needed temporary station site location (The physical storage address will be provided by Fire department at a later time during the construction stage). Also, the majority of the related site improvements of the temporary site are to be demolished and removed, as noted in the plans. The entire scope of work is based on the entire contract documents such as but not limited to Contracts, addenda, drawings, specifications, reports, utility design documents, etc.
- B. Base Bid: The bid shall include labor, material, equipment, services and transportation necessary for the demolition and construction of the Project as identified in the Contract Documents.
- C. Sustainable/"Green" Requirements: The building(s) on the site and the sitework adjacent to the building(s) are designed and shall be constructed as sustainable entities. The requirements for sustainable/"green" construction are contained throughout the Contract Documents and in particular are specified in the following specification sections:
1. Section 01 35 43 - Environmental Procedures.
 2. Section 01 81 13 – Sustainable Design Requirements.
- D. The requirements of Tech Specs Part 1 – Supplementary Special Provisions, Appendices of Attachment E – General shall apply to all specification sections in Divisions 02 through 48 as if fully repeated therein and shall govern if there is a conflict.
- E. Extra Work: Performed at the same labor rates and component rates as the original work as specified and indicated on Drawings.
- F. Costs for Work which is not specified or indicated on Drawings: Subcontractors shall provide costs based upon work specified or indicated on Drawings. In addition, Subcontractors shall provide a listing (with prices) for work that in their opinion will need to be accomplished to provide a complete and operational building project. No additional cost(s) will be paid by the Owner that is not identified at the time of bidding.

3. On delivery, inspect products jointly with Contractor.
 4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
 5. Arrange for Manufacturers' warranties, inspections and service.
- C. Contractor's Responsibilities:
1. Contractor shall give Owner written notice stating dates when Owner-furnished items must be received at the job site to insure Project completion in accordance with established schedule.
 2. Review Owner-reviewed Shop Drawings, Product data, and Samples
 3. Receive and unload products at site; inspect for completeness or damage, jointly with Owner.
 4. Handle, store, assemble, install, connect and finish such products, including furnishing lubricants and fluids and procedures required to render product serviceable and operative.
 5. Contractor is responsible for the coordination and interface of Owner-Furnished and Installed work with Work of this Contract to provide all required mechanical and electrical rough-ins, openings, supports, dimensions, etc., as required for a complete installation

1.5 CONTRACTOR USE OF SITE

- A. General: Contractor shall have full use of the site within Contract Limit Lines indicated for construction operations during the construction period.

1.6 PERMITS, FEES AND NOTICES

- A. Plan check fees have been paid by the Owner.
- B. The Contractor shall secure and pay for the building permit and for other permits and governmental fees, licenses and special inspections, (see also Attachment E – Supplementary Special Provisions, Appendices)
- C. The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations and lawful orders of public authority bearing on the performance of the Work.
- D. It is not the responsibility of the Contractor to make certain that the Contract Documents are in accordance with applicable laws, statutes, building codes and regulations. If the Contractor observes that any of the Contract Documents are at variance therewith in any respect, he shall promptly notify the Resident Engineer in writing, and any necessary changes shall be accomplished by appropriate Modification.
- E. If the Contractor performs Work knowing it to be contrary to such laws, ordinances, rules and regulations, and without such notice to the Resident Engineer, the Contractor shall assume full responsibility there for and shall bear attributable costs.

1.7 SPECIAL SITE AND PROJECT CONDITIONS

- A. Contractor shall ensure that exposed piping, valves, connections, drains and apparatus of any kind shall be fully reviewed and coordinated with the Resident Engineer.
 - 1. Exposed sprinkler heads shall typically be placed in the center of the ceiling tile or pattern.
 - 2. The shop drawings shall explicitly cloud all exposed conditions and shall be reviewed, authorized and initialed by the Resident Engineer prior to installation.
 - a. The purpose of this review is to ensure that all components of this system are placed in as discrete and as minimally impacting a location as possible.
 - b. Failure by the fire sprinkler system designer/subcontractor to point out and secure Resident Engineer review and written approval of all exposed conditions shall result in relocation of any exposed items as directed by the Resident Engineer at no additional cost to the owner.
 - 3. Contractor shall ensure that hangers, supports, pipes, braces to be hung true and vertical (neat and clean) where exposed to view.
- B. Additional time required by Architect & Architect's consultants due to negligence of General Contractor and/or Subcontractor shall be paid for by General Contractor (through the Resident Engineer) per their hourly rates.

1.8 APPROVED APPLICATORS

- A. Where specific instructions in the Specifications require that a particular product and/or material be applied and/or installed by an "approved applicator" it shall be the Contractor's responsibility to insure that any Subcontractor or Subcontractor used for such Work is in fact currently certified by the particular Manufacturer for this type of installation or application.

1.9 APPROVED MANUFACTURERS

- A. Each Section includes a list of Manufacturers whose equipment is acceptable as to manufacture, subject to conformance with the Contract Documents. Careful checking must be made by the Contractor and the manufacturer or equipment supplier to verify that the equipment will meet all capacities, requirements, space allocations and is suitable to the intended purpose.

1.10 REFERENCE DATA

- A. The Contractor shall establish and maintain all buildings and construction grades, lines, levels, and bench marks. (See also Attachment E – Supplementary Special Provisions, Appendices)

1.11 ARCHITECTURAL BARRIERS

- A. It is the desire of the Owner that the facilities and improvements constructed under this Contract meet or exceed the intent of applicable public law concerning prohibition of discrimination, and that no individual be discriminated against on the basis of disability in the full and equal enjoyment of the goods, services, facilities, privileges, advantages, or accommodations of this completed Project. The designers and drafters of these Documents have intended to incorporate those Owner's intentions into these Documents.
- B. It is recognized that there may be products not incorporated into these Documents that may more nearly meet the Owner's desires than those included.

SECTION 01 31 19
PROJECT MEETINGS

PART 1 GENERAL

1.1 GENERAL

- A. See also Attachment E – Supplementary Special Provisions, Appendices and Whitebook.

1.2 PRECONSTRUCTION CONFERENCE

- A. A Preconstruction Conference to discuss the Project work will be held at a time and location designated by the Resident Engineer.
- B. Contractor, and representatives of major Subcontractors, shall meet with Owner and Architect. The purpose of this conference is to discuss the Project in detail, including scheduling of Work, and to answer questions. Unless followed up in writing, verbal authorizations or acknowledgement of those present are not binding.
- C. Meeting minutes will be taken by the Resident Engineer.
- D. LEED™ requirements as specified in Section 01 81 13 shall be reviewed during this conference.

1.3 PROGRESS MEETINGS

- A. At time designated by Resident Engineer, bi-weekly Progress Meeting will be held at Project site.
- B. Contractor and representatives of major Subcontractors shall meet with Resident Engineer.
- C. Contractor is responsible for notifying Subcontractors of their required attendance. These meetings will address progress of the Work and problems that may have developed since the previous meeting.
- D. LEED™ requirements as specified in Section 01 81 13 shall be reviewed with the various subcontractors as applicable to the stage of the work and during each progress meeting.

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 GENERAL

- A. See also Attachment E – Supplementary Special Provisions, Appendices and Green Book.

1.2 CONSTRUCTION SCHEDULE

- A. Submit 6 copies of the Construction Schedule within 35 calendar days after Notice to Proceed, broken down by Trade or Material, to the Resident Engineer for approval prior to the first Progress Payment Request. Schedule shall be by Critical Path Method (CPM) or bar graph type, and shall show proposed starting and completion dates for each Trade and activity for the Work. Submit 6 copies of updated schedule at each Progress Payment Request field review to the Resident Engineer.
- B. Submit completed construction schedule to Resident Engineer no later than 35 calendar days after Notice to Proceed and update monthly during construction. Submit current schedule with each application for payment.
- C. Submit completed material delivery schedule to the Resident Engineer no later than 35 calendar days after the date of the Notice to Proceed. Identify material critical to the progress of the Project and those for which long lead time in procurement is anticipated. Indicate projected dates for submittal, order and delivery of such material.

1.3 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- A. Shop Drawings: (See also Attachment E – Supplementary Special Provisions, Appendices and Green Book.)
 - 1. Following Contractor's review and approval, submit shop drawings to the Resident Engineer for review.
 - a. Electronic (PDF format only) submittal transmitted via e-mail is preferred.
 - b. Shop drawings submitted electronically will be reviewed and returned electronically.
 - 2. Full sized scaled (24 inch by 36 inch) drawings on paper (minimum 6 sets) shall be provided for the following to allow for Architect's redline:
 - a. Door details and elevations.
 - b. Window details and elevations.
 - c. Steel framing.
 - d. Reinforcing in foundations.
 - e. Millwork/casework details and elevations.
 - f. Solid Composite Exterior Wall Panels details and elevations
 - 3. The Resident Engineer will review the Drawings and affix a stamp indicating the findings of the review, and will return same to the Contractor.
 - 4. Comments, if any, will be noted directly on the electronic copy or on a copy of the full sized scaled drawings on paper.
 - 5. The Contractor shall distribute the appropriate number of copies to the various Trades and to Contractor's job personnel as required.
 - 6. Fire Alarm System/Fire Sprinklers System Shop Drawings shall be submitted to Resident Engineer prior to submittal to the state and local Fire Marshal for approval. Obtain approval prior to installation. Fire Marshal inspection, test and approval of completed installations shall be obtained prior to acceptance of the systems and Substantial Completion of the Project.

- D. Provide two slack No. 9 safety wire hangers or threaded rods for each recessed mounted fluorescent fixture. Secure from opposite corners of each fixture and fasten to structure above, independent of ceiling system. Locate supports not more than 6 inches from fixture corners.
- E. Electrical Contractor is to provide and install locking clips for all fixtures installed in suspended ceilings. The locking clip is to be attached to the fixture with a sheet metal screw or similar device and secured to the main or supporting T-bar runner to guarantee a secure installation. Clips shall be located at or near fixture corners.
- F. Fixtures which are of a size smaller than the ceiling grid shall be located as indicated on the reflected ceiling plans. Fixtures shall be supported independently of the grid ceiling with at least two ¾ inch metal channels spanning and secured to the ceiling tees.
- G. Metal decking shall not be pierced for luminaire support.
- H. Where pendants or rods are longer than 48 inches, brace to limit luminaire swinging.
- I. Brace suspended luminaires installed near ducts or other elements so that they do not swing into obstructions.
- J. Wall mounted light fixtures shall be supported from four-square outlet box plaster ring and from wall at non-feed end with two 1/4-inch toggle bolts for gypsum board walls or 1/4-inch bolts to pre-set inserts for concrete wall.

3.3 COMPACT FLUORESCENT FIXTURES

- A. Install as for incandescent fixture, except where Attachment E – Supplementary Special Provisions, Appendices are required for ballast arrangement; provide access to ballasts in all cases.

3.4 FLUORESCENT FIXTURES

- A. Recessed Type: Support fixtures independent of the ceiling suspension system. Provide four integral tabs (one at each corner) which rotate into position and lock on ceiling tees after fixture is lifted into the ceiling cavity or provide four clips similar to Caddy #535. Provide mounting frames suitable for the ceiling type. In addition, provide slack earthquake safety wire hangers secured diagonally from opposite fixture corners to structural members above suspended ceiling. Comply with Authority Having Jurisdiction.
- B. Wall Mounted Type: Support from four-square outlet box plaster ring and from wall at non-feed end with two 1/4 inch toggle bolts for gypsum board walls or ¼ inch bolts to pre-set inserts for concrete wall.
- C. Fluorescent lighting fixtures shall be switched as shown on electrical drawings. Four-lamp fixtures shown with 2-level switching shall be wired with lamps, 1, 4 and 2, 3 each on separate switch-legs for 2-level switching. Three-lamp fixtures shown with 2-level switching shall be wired with lamps, 1, 3 and 2 each on separate switch-legs for 2-level switching.
- D. If clearance above T-bar system is too restricted to "tip-in" fixture, coordinate with acoustic ceiling installer by leaving one cross T-bar off until the cross T-bar shall be secured into its proper place. Fluorescent fixtures installed in hidden spline type ceilings shall have supporting channels installed by Ceiling Contractor to adequately support the

fixture without providing additional hangers from the structural ceiling above the suspended ceiling.

- E. Install air handling light fixtures with dampers closed and ready for adjustment.
- F. Surface Mounted Type:
 - 1. Where mounted on accessible ceilings, support from structural members above ceiling by means of hanger rods through ceiling or as approved.
 - 2. Continuous Runs of Fixtures: Laser sight to insure fixtures are straight and true when sighting from end to end, regardless of irregularities in the ceiling. Where light fixtures are so installed, omit ornamental ends between sections.
- G. Pendant Mounted Type:
 - 1. Provide strong back channel entire fixture length unless light fixture is designed specifically to be self-supporting.
 - 2. Where suspended below accessible ceiling, provide structural support at suspended ceiling level from structural members above ceiling. Do not run hanger rods through ceiling.
 - 3. Continuous Runs of Light Fixtures: Laser sight to insure fixtures are straight and true when sighting from end to end, regardless of irregularities in the ceiling. Where light fixtures are so installed, omit ornamental ends between sections.
- H. Install lighting fixture diffusers only after construction work, painting and clean up are completed.

3.5 HIGH INTENSITY DISCHARGE FIXTURES

- A. Install as for incandescent fixture, except where Attachment E – Supplementary Special Provisions, Appendices are required for ballast arrangement; provide access to ballasts in all cases.
- B. Provide an earthquake chain as noted above for each fixture when fixture is supported by the ceiling suspension system. Provide two chains for units larger than 250 watts or 12" x 24" in dimension.
- C. For fixtures with remote ballasts, isolate ballast from the structure.

3.6 LIGHTING CONTROL

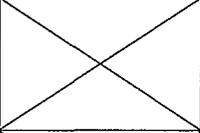
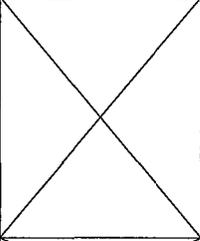
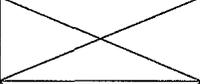
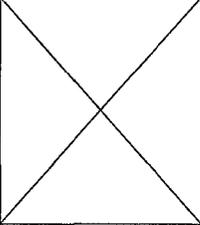
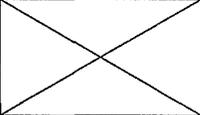
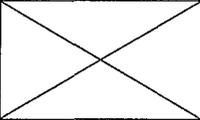
- A. Provide branch circuiting in coordination with lighting control requirements of specification section describing Lighting Control Equipment and as indicated on Electrical Drawings.

3.7 CLEANING AND ADJUSTING

- A. Remove protective plastic covers from light fixtures and fixture diffusers only after construction work, painting and clean-up are completed. Remove, clean, and reinstall all dirty lamps, reflectors and diffusers.
- B. Clean fixtures internally and externally after installation. Use methods and materials recommended by manufacturer for cleaning Alzak reflectors and other surfaces.
- C. Make final adjustment of aimable light fixtures and adjustable light settings under the direction of the Lighting Designer during a scheduled period of time prior to the completion of the project, after normal business hours if required. Include all equipment and personnel expenses including overtime required for focusing.

BID ITEMS

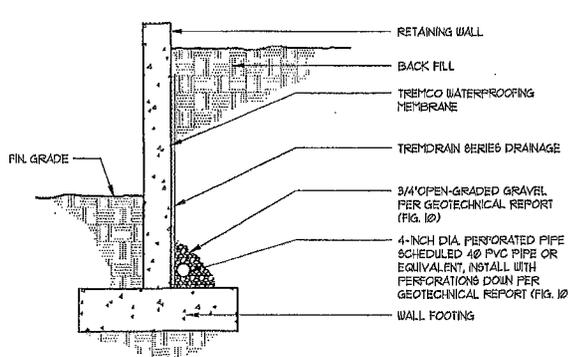
*** PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY ***
TO BE SUBMITTED IN ELECTRONIC FORMAT ONLY
SEE INSTRUCTIONS TO BIDDERS, FOR FURTHER INFORMATION

Payment Reference	NAICS	Description	Unit Price	Extension
BASE BID				
(1-8)				
Tech. Spec/ Plans	236220	Construction of Temporary Fire Station No. 22 and Related Site Improvements at 1055 Catalina Blvd, San Diego, CA 92107		\$
701-13.9.5	237990	WPCP - Development - For Temporary Fire Station Best Management Practices as Required by the City of San Diego Land Development Manual Storm Standards of March 24, 2008 Report & Water Quality Technical Report dated May 18, 2011 per Contract Documents		\$
701-13.9.5	237990	WPCP - Implementation - For Temporary Fire Station		\$
7-5.3	236220	Building Permits for Temporary Fire Station : including City of San Diego, Sheet C4 Fees, Water & Sewer Capacities and Connection Fees (Reimbursement). Contractor to Include in Project Allowance for Mechanical, Plumbing and Electrical Permits - Type I		\$ 10,000.00
Tech. Spec/ Plans	238210	SDG&E Service Fee, Dry Utilities Connections, Pack Bell, AT&T and Time Warner - Temporary Fire Station – Type I		\$ 7,000.00
2-1.4	524126	Bond (Payment and Performance) - Temporary Fire Station		\$

ADDENDUM "A"

Payment Reference	NAICS	Description	Unit Price	Extension
Tech. Spec/ Plans	236220	FF & E - Temporary Fire Station – Type I		\$ 10,000.00
9-3.5	-	Field Orders - Temporary Fire Station - Type II		\$ 30,000.00
(9-17)				
Tech. Spec/ Plans	236220	Construction of Permanent Fire Station No. 22 and Related Site Improvements, Including but Not Limited to Photovoltaic Solar Panels at Carport Roof Includes Installation and Demolition of Existing Fire Station at 1055 Catalina Blvd, San Diego, CA 92107.		\$
701-13.9.5	236220	WPCP - Development - For Permanent Fire Station Best Management Practices as Required by the City of San Diego Land Development Manual Storm Standards of March 24, 2008 Report & Water Quality Technical Report dated May 18, 2011 per Contract Documents		\$
701-13.9.5	236220	WPCP - Implementation - For Permanent Fire Station – Type I		\$ 20,000.00
7-5.3	236220	Building Permits for Permanent Fire Station for Any Additional Permits - Type I		\$ 10,000.00
Tech. Spec/ Plans	238210	SDG&E Service Fee, Dry Utilities Connections, Pack Bell, AT&T and Time Warner - Permanent Fire Station – Type I		\$ 30,000.00
9-3.5	-	Field Orders - Permanent Fire Station -Type II		\$ 200,00.00
2-1.4	524126	Bond (Payment and Performance) - Permanent Fire Station		\$
Tech. Spec/ Plans	236220	FF & E - Permanent Fire Station – Type I		\$ 80,000.00

Payment Reference	NAICS	Description	Unit Price	Extension
Tech. Spec/ Plans	238990	Remediation of Possible Contaminated Unusable Soil - Type II (to Include Preparation of Hazardous Waste Management Plan and Reporting per 'Whitebook, Section 803-16a' as Determined by GEOCON Site Assessment Report, dated July 2000)	X	\$ 20,000.00
TOTAL BASE BID:				\$



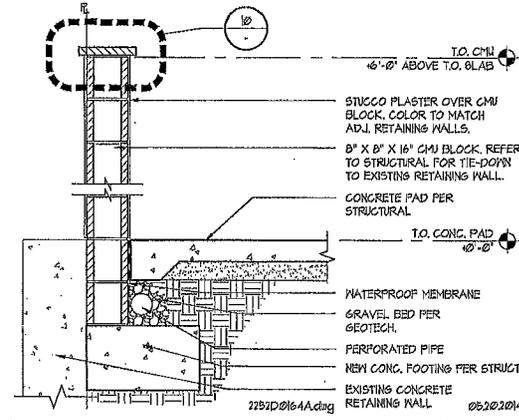
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05.20.2014

RETAINING WALL DRAINAGE DETAIL

SCALE
1/2" = 1'-0"

13



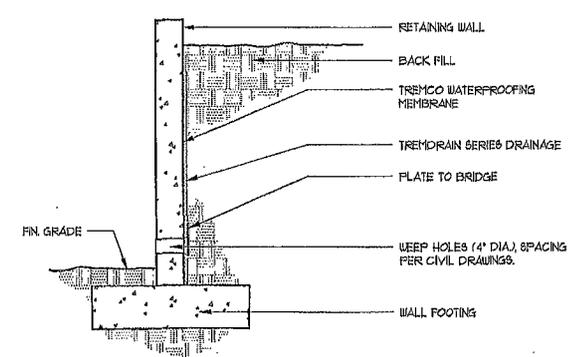
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05.20.2014

CMU WALL

SCALE
3/4" = 1'-0"

9



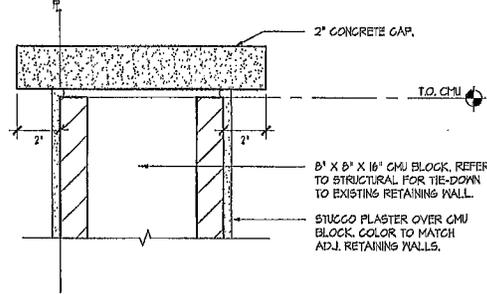
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RETAINING WALL DRAINAGE DETAIL

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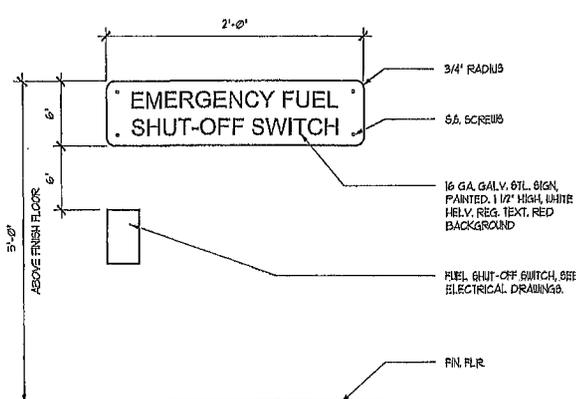
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06.10.2011

CONCRETE CAPITAL AT CMU

SCALE
3/4" = 1'-0"

10

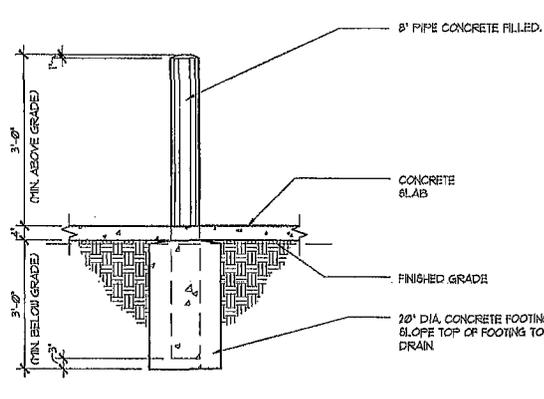


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FUEL SIGN

SCALE
1 1/2" = 1'-0"

15



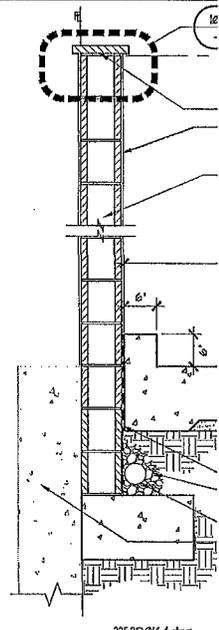
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06.24.2014

GUARD POSTS AT FUEL TANK

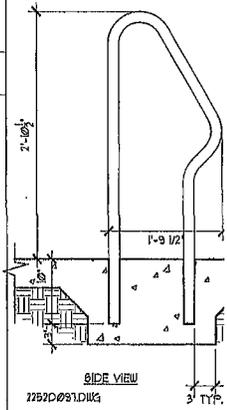
SCALE
1/2" = 1'-0"

11

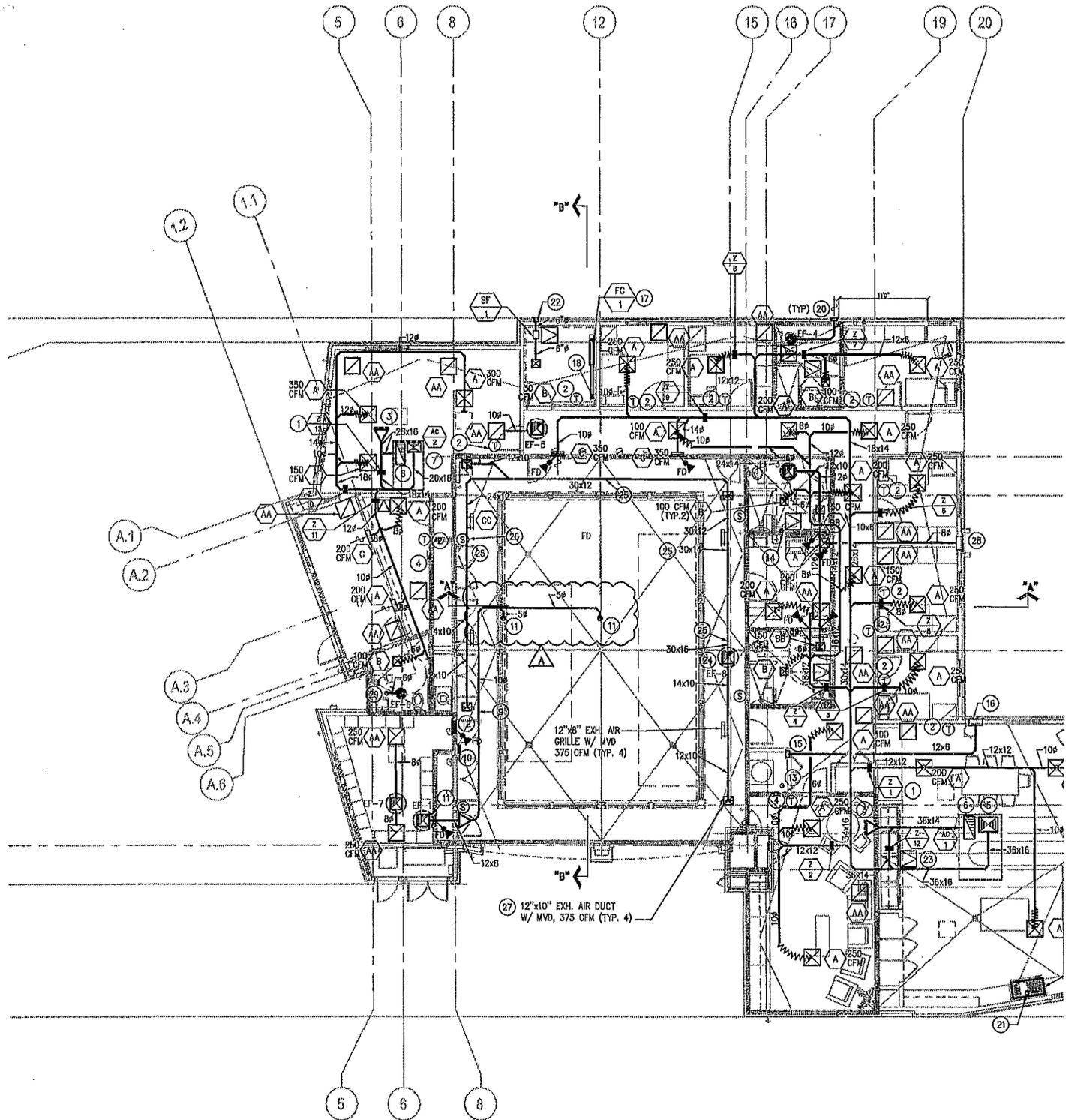


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CMU AT RAIL



PRE-FAB BIKE RACK



MECHANICAL FLOOR PLAN

GARAGE VENTILATION CALCULATIONS

TOTAL AREA = 1,720 SQ. FT.

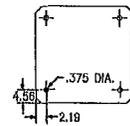
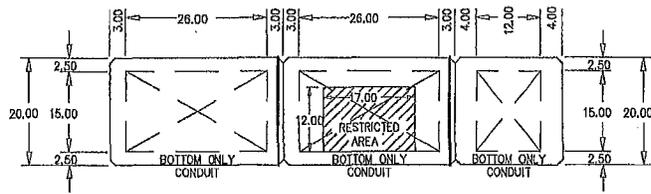
MINIMUM EXHAUST AIRFLOW = 1,720 SQ. FT. x 1.5 CFM/SQ. FT.

= 2,580 CFM REQUIRED

EXHAUST FAN SPECIFIED: PLYMOVENT MODEL TEV-585
 EXHAUST FAN DESIGNATION: EF-1
 EXHAUST FAN CAPACITY: 2600 CFM, 3 HP

GENERAL NC

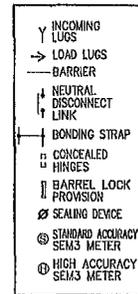
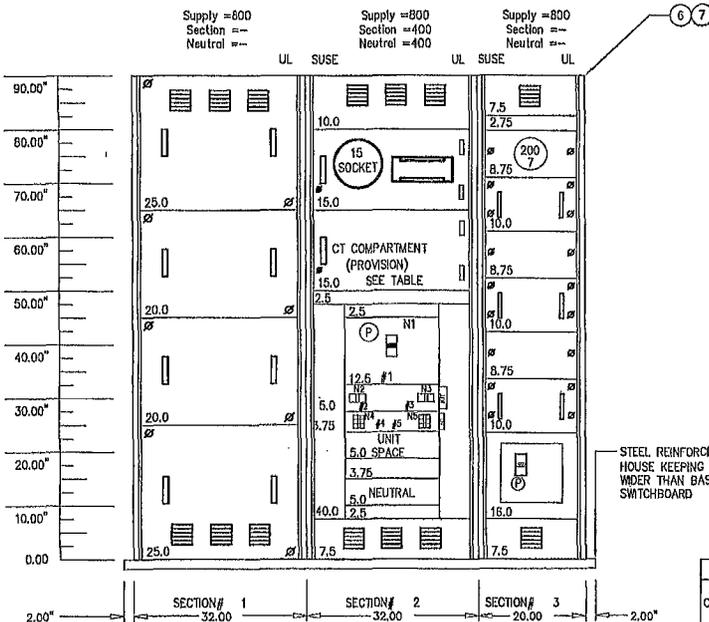
1. PROVIDE MANUAL VOLUME DIFFUSERS, REGISTERS AND LOCATED IN HARD LID CEILING SHALL BE PROVIDED WITH VENTLOCK 677.
2. PROVIDE CEILING ACCESS ARE LOCATED IN HARD LID INACCESSIBLE.



TYPICAL BOLT-DOWN HOLE PROVISION FOR CUBICLE BOTTOM EACH SECTION

FEEDER	
NUMBER	FROM
1	MSB-1
2	MSB-2
3	MSB-3
4	MSB-4
5	GATS
6	ELP
7	LP

* FEEDER LENGTH DROP CALCULATION FOR QUANTITY



STEEL REINFORCED CONCRETE HOUSE KEEPING PAD 2" DEEP, 2" WIDER THAN BASE OF SWITCHBOARD

NOTES

CONSTRUCTION	SWITCHBOARD IS BUILT AND LABELED PER UL 891 IN EFFECT.
INCOMING SERVICE	AMPERES: 800 SYSTEM VOLTAGE: 208Y/120 3 ϕ , 4W WYE AC
INTERRUPTING RATING	THE SHORT CIRCUIT INTERRUPTING CAPABILITY IS 65,000 RMS SYMMETRICAL AMPERES AT 208 VOLTS BASED ON THE LOWEST SHORT CIRCUIT CURRENT RATING OF THE INDIVIDUAL OR SERIES RATED COMBINATION DEVICES INSTALLED AT TIME OF MANUFACTURE OF BUSSING STRUCTURE, THE BUSSING STRUCTURE IS CONSTRUCTED TO WITHSTAND FAULTS OF 65,000 RMS SYMMETRICAL AMPERES.
ENCLOSURE	ENCLOSURE IS TYPE NEMA 1 FOR INDOOR APPLICATION, SEISMIC ENCLOSURE SHALL BE CONSTRUCTED TO MEET SEISMIC REQUIREMENTS.
EXTERIOR	ANSI 61 LIGHT GREY PAINT.
TERMINATIONS	TERMINATIONS ARE ACCESSIBLE FROM THE FRONT.
BUS BARS	SILVER PLATED COPPER BUS BARS SIZED ON BASIS OF 65°C MAXIMUM TEMPERATURE RISE.
BUS BARS	THE GROUND BUS IN THIS SWITCHBOARD IS COPPER SIZED PER UL 891 OR GREATER.
UTILITY	SAN DIEGO GAS & ELECTRIC (SDG&E)
NAMEPLATE	NAMEPLATES ATTACHED WITH ADHESIVE.

ABBREVIATIONS

UL	INDICATES THAT THE MARKED SWITCHBOARD SECTION COMPLIES WITH ALL APPLICABLE UNDERWRITERS LABORATORIES STANDARDS AND IS IDENTIFIED WITH A UL LABEL.
SUSE	INDICATES THAT THE MARKED SWITCHBOARD SECTION IS SUITABLE ONLY FOR USE AS SERVICE ENTRANCE EQUIPMENT.
UNIT SPACE	INDICATES UNOCCUPIED AREA INTENDED FOR FUTURE USE.
P	INDICATES PADLOCK PROVISION.

INSTALLATION NOTES

CAUTION: IF SWITCHBOARD IS INSTALLED ON A HOUSEKEEPING SLAB GREATER THAN 2-1/2" THE METER MAY BE OVER THE 6"-3" MAXIMUM ALLOWABLE METER HEIGHT.

