

City of San Diego

CONTRACTOR'S NAME: Marcon Engineering, Inc.
ADDRESS: 876 N Broadway, Escondido, CA 92025
TELEPHONE NO.: (760) 871-0477 x31 **FAX NO.:** _____
CITY CONTACT: Juan E. Espindola, Senior Contract Specialist, Email: JEEspindola@sandiego.gov
Phone No. (619) 533-4491
M. Garcia-Quilico / R. W. Bustamante / B. Richardson

BIDDING DOCUMENTS



FOR

BALBOA PARK BUD KEARNS AQUATIC COMPLEX IMPROVEMENTS

BID NO.: K-20-1815-DBB-3-A
SAP NO. (WBS/IO/CC): S-17000
CLIENT DEPARTMENT: 1714
COUNCIL DISTRICT: 3
PROJECT TYPE: BE

THIS CONTRACT WILL BE SUBJECT TO THE FOLLOWING:

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

BID DUE DATE:

2:00 PM

JANUARY 21, 2020

CITY OF SAN DIEGO'S ELECTRONIC BIDDING SITE, PLANETBIDS

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

ENGINEER OF WORK

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

Sandra Gramley
1) Registered Architect

11-19-19
Date

Seal:



[Signature]
2) For City Engineer

11/19/19
Date

Seal:



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REQUIRED DOCUMENTS SCHEDULE DURING BIDDING AND AWARDING

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

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

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

ITEM	DOCUMENT TO BE SUBMITTED	WHEN DUE	FROM
1.	Bid Bond	At Time of Bid	ALL BIDDERS
2.	Contractors Certification of Pending Actions	At Time of Bid	ALL BIDDERS
3.	Mandatory Disclosure of Business Interests	At Time of Bid	ALL BIDDERS
4.	Debarment and Suspension Certification	At Time of Bid	ALL BIDDERS
5.	Bid Bond (Original)	Within 24 Hours of Bid opening	5 APPARENT LOW BIDDERS
6.	SLBE Good Faith Effort Documentation	Within 3 working days of bid opening	ALL BIDDERS
7.	Form AA60 – List of Work Made Available	Within 3 working days of bid opening with Good Faith Effort (GFE) documentation	ALL BIDDERS
8.	Proof of Valid DBE-MBE-WBE-DVBE Certification Status e.g., Certs.	Within 3 working days of bid opening with Good Faith Effort (GFE) documentation	ALL BIDDERS
9.	Contract Forms - Agreement	Within 10 working days of receipt by bidder of contract forms	APPARENT LOW BIDDER
10.	Contract Forms - Payment and Performance Bond	Within 10 working days of receipt by bidder of contract forms	APPARENT LOW BIDDER

ITEM	DOCUMENT TO BE SUBMITTED	WHEN DUE	FROM
11.	Certificates of Insurance and Endorsements	Within 10 working days of receipt by bidder of contract forms	APPARENT LOW BIDDER
12.	Listing of "Other Than First Tier" Subcontractors	Within 10 working days of receipt by bidder of contract forms	APPARENT LOW BIDDER

NOTICE INVITING BIDS

1. **SUMMARY OF WORK:** This is the City of San Diego's (City) solicitation process to acquire Construction services for **Balboa Park Bud Kearns Aquatic Complex Improvements**. For additional information refer to Attachment A.
2. **FULL AND OPEN COMPETITION:** This solicitation is subject to full and open competition and may be bid by Contractors on the City's approved Prequalified Contractors List. For information regarding the Contractors Prequalified list visit the City's web site: <http://www.sandiego.gov>.
3. **ESTIMATED CONSTRUCTION COST:** The City's estimated construction cost for this project is **\$2,350,000**.
4. **BID DUE DATE AND TIME ARE:** January 21, 2020 at 2:00 P.M.
5. **PREVAILING WAGE RATES APPLY TO THIS CONTRACT:** Refer to Attachment D.
6. **LICENSE REQUIREMENT:** To be eligible for award of this contract, Prime contractor must possess the following licensing classification: **A**
 - 6.1 **ADDITIONAL LICENSE REQUIREMENTS:** All swimming pool related work shall be installed by **C-53** Swimming Pool contractors.
7. **SUBCONTRACTING PARTICIPATION PERCENTAGES:** Subcontracting participation percentages apply to this contract.
 - 7.1. The City has incorporated **mandatory** SLBE-ELBE subcontractor participation percentages to enhance competition and maximize subcontracting opportunities. For the purpose of achieving the mandatory subcontractor participation percentages, a recommended breakdown of the SLBE and ELBE subcontractor participation percentages based upon certified SLBE and ELBE firms has also been provided to achieve the mandatory subcontractor participation percentages:

1. SLBE participation	4.0%
2. ELBE participation	8.4%
3. Total mandatory participation	12.4%
 - 7.2. The Bid may be declared non-responsive if the Bidder fails to meet the following requirements:
 - 7.2.1. Include SLBE-ELBE certified subcontractors at the overall mandatory participation percentage identified in this document; **OR**
 - 7.2.2. Submit Good Faith Effort documentation, saved in searchable Portable Document Format (PDF) and stored on Compact Disc (CD) or Digital Video Disc (DVD), demonstrating the Bidder made a good faith effort to outreach to and

include SLBE-ELBE Subcontractors required in this document within 3 Working Days of the Bid opening if the overall mandatory participation percentage is not met. **OR**

7.2.3 Attending the Pre-Bid Site Visit.

- 8. PRE-BID SITE VISIT:** All those wishing to submit a bid **MUST** visit the Work Site with the Engineer. The purpose of the Site visit is to acquaint Bidders with the Site conditions. To request a sign language or oral interpreter for this visit, call the Public Works Contracts at (619) 533-3450 at least 5 Working Days prior to the meeting to ensure availability. Failure to attend the Mandatory Pre-Bid Site Visit may result in the Bid Being Deemed non-responsive. The Pre-Bid Site Visit is scheduled as follows:

Time: 10:00 A.M.
Date: December 18, 2019
Location: 2229 Morley Field Drive, San Diego, CA 92104

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

9. AWARD PROCESS:

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

10. SUBMISSION OF QUESTIONS:

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

Public Works Contracts
525 B Street, Suite 750 (7th Floor)
San Diego, California, 92101
Attention: Juan E. Espindola

OR:

JEspindola@sandiego.gov

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

INSTRUCTIONS TO BIDDERS

1. PREQUALIFICATION OF CONTRACTORS:

- 1.1. Contractors submitting a Bid must be pre-qualified for the total amount proposed, including all alternate items, prior to the date of submittal. Bids from contractors who have not been pre-qualified as applicable and Bids that exceed the maximum dollar amount at which contractors are pre-qualified may be deemed **non-responsive** and ineligible for award.
- 1.2. The completed application must be submitted online no later than 2 weeks prior to the bid opening.
- 1.3. **Joint Venture Bidders Cumulative Maximum Bidding Capacity:** For projects with an engineer's estimate of \$30,000,000 or greater, Joint Ventures submitting bids may be deemed responsive and eligible for award if the cumulative maximum bidding capacity of the individual Joint Venture entities is equal to or greater than the total amount proposed.
 - 1.3.1. Each of the entities of the Joint Venture must have been previously prequalified at a minimum of \$15,000,000.
 - 1.3.2. Bids submitted with a total amount proposed of less than \$30,000,000 are not eligible for Cumulative Maximum Bidding Capacity prequalification. To be eligible for award in this scenario, the Joint Venture itself or at least one of the Joint Venture entities must have been prequalified for the total amount proposed.
 - 1.3.3. Bids submitted by Joint Ventures with a total amount proposed of \$30,000,000 or greater on a project with an engineer's estimate of less than \$30,000,000 are not eligible for Cumulative Maximum Bidding Capacity prequalification.
 - 1.3.4. The Joint Venture designated as the Apparent Low Bidder shall provide evidence of its corporate existence and furnish good and approved bonds in the name of the Joint Venture within 14 Calendar Days of receipt by the Bidder of a form of contract for execution.
- 1.4. Complete information and links to the on-line prequalification application are available at:

<http://www.sandiego.gov/cip/bidopps/prequalification>
- 1.5. Due to the City's responsibility to protect the confidentiality of the contractors' information, City staff will not be able to provide information regarding contractors'

prequalification status over the telephone. Contractors may access real-time information about their prequalification status via their vendor profile on [PlanetBids™](#).

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

2.1. BIDDERS MUST BE PRE-REGISTERED with the City's bidding system and possess a system-assigned Digital ID in order to submit an electronic bid.

2.2. The City's bidding system will automatically track information submitted to the site including IP addresses, browsers being used and the URLs from which information was submitted. In addition, the City's bidding system will keep a history of every login instance including the time of login, and other information about the user's computer configuration such as the operating system, browser type, version, and more. Because of these security features, Contractors who disable their browsers' cookies will not be able to log in and use the City's bidding system.

2.3. The City's electronic bidding system is responsible for bid tabulations. Upon the bidder's or proposer's entry of their bid, the system will ensure that all required fields are entered. **The system will not accept a bid for which any required information is missing.** This includes all necessary pricing, subcontractor listing(s) and any other essential documentation and supporting materials and forms requested or contained in these solicitation documents.

2.4. BIDS REMAIN SEALED UNTIL BID DEADLINE. eBids are transmitted into the City's bidding system via hypertext transfer protocol secure (https) mechanism using SSL 128-256 bit security certificates issued from Verisign/Thawte which encrypts data being transferred from client to server. Bids submitted prior to the "Bid Due Date and Time" are not available for review by anyone other than the submitter who has until the "Bid Due Date and Time" to change, rescind or retrieve its proposal should it desire to do so.

2.5. BIDS MUST BE SUBMITTED BY BID DUE DATE AND TIME. Once the bid deadline is reached, no further submissions are accepted into the system. Once the Bid Due Date and Time has lapsed, bidders, proposers, the general public, and City staff are able to immediately see the results on line. City staff may then begin reviewing the submissions for responsiveness, EOCB compliance and other issues. The City may require any Bidder to furnish statement of experience, financial responsibility, technical ability, equipment, and references.

2.6. RECAPITULATION OF THE WORK. Bids shall not contain any recapitulation of the Work. Conditional Bids may be rejected as being non-responsive. Alternative proposals will not be considered unless called for.

2.7. BIDS MAY BE WITHDRAWN by the Bidder only up to the bid due date and time.

2.7.1. Important Note: Submission of the electronic bid into the system may not be instantaneous. Due to the speed and capabilities of the user's internet service provider (ISP), bandwidth, computer hardware and other variables, it may take time for the bidder's submission to upload and be received by the City's eBidding system. It is the bidder's sole responsibility to ensure their bids are received on time by the City's eBidding system. The City of San Diego is not responsible for bids that do not arrive by the required date and time.

2.8. ACCESSIBILITY AND AMERICANS WITH DISABILITIES ACT (ADA) COMPLIANCE: To request a copy of this solicitation in an alternative format, contact the Public Works Contract Specialist listed on the cover of this solicitation at least five (5) working days prior to the Bid/Proposal due date to ensure availability.

3. ELECTRONIC BID SUBMISSIONS CARRY FULL FORCE AND EFFECT

3.1. The bidder, by submitting its electronic bid, acknowledges that doing so carries the same force and full legal effect as a paper submission with a longhand (wet) signature.

3.2. By submitting an electronic bid, the bidder certifies that the bidder has thoroughly examined and understands the entire Contract Documents (which consist of the plans and specifications, drawings, forms, affidavits and the solicitation documents), and that by submitting the eBid as its bid proposal, the bidder acknowledges, agrees to and is bound by the entire Contract Documents, including any addenda issued thereto, and incorporated by reference in the Contract Documents.

3.3. The Bidder, by submitting its electronic bid, agrees to and certifies under penalty of perjury under the laws of the State of California, that the certification, forms and affidavits submitted as part of this bid are true and correct.

3.4. The Bidder agrees to the construction of the project as described in Attachment "A-Scope of Work" for the City of San Diego, in accordance with the requirements set forth herein for the electronically submitted prices. The Bidder guarantees the Contract Price for a period of 120 days from the date of Bid opening. The duration of the Contract Price guarantee shall be extended by the number of days required for the City to obtain all items necessary to fulfill all conditions precedent.

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

to any other applicable law, or by order of any court or government agency, and the Contractor will hold the City harmless for release of this information.

5. CONTRACTOR REGISTRATION AND ELECTRONIC REPORTING SYSTEM:

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

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

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 14 Calendar Days after receiving the Contract forms.

7. INSURANCE REQUIREMENTS:

7.1. 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.

7.2. Refer to sections 5-4, "INSURANCE" of the Supplementary Special Provisions (SSP) for the insurance requirements which must be met.

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

Title	Edition	Document Number
Standard Specifications for Public Works Construction ("The GREENBOOK") http://www.greenbookspecs.org/	2018	PWPI010119-01
City of San Diego Standard Specifications for Public Works Construction ("The WHITEBOOK")* https://www.sandiego.gov/publicworks/edocref/greenbook	2018	PWPI010119-02
City of San Diego Standard Drawings* https://www.sandiego.gov/publicworks/edocref/standarddraw	2018	PWPI010119-03
Citywide Computer Aided Design and Drafting (CADD) Standards https://www.sandiego.gov/publicworks/edocref/drawings	2018	PWPI010119-04

Title	Edition	Document Number
California Department of Transportation (CALTRANS) Standard Specifications – http://www.dot.ca.gov/des/oe/construction-contract-standards.html	2018	PWPI030119-05
CALTRANS Standard Plans http://www.dot.ca.gov/des/oe/construction-contract-standards.html	2018	PWPI030119-06
California Manual on Uniform Traffic Control Devices Revision 4 (CA MUTCD Rev 4) http://www.dot.ca.gov/trafficops/camutcd/	2014	PWPI030119-08
<p>NOTE: *Available online under Engineering Documents and References at: http://www.sandiego.gov/publicworks/edocref/index.shtml</p> <p>*Electronic updates to the Standard Drawings may also be found in the link above</p>		

9. **CITY'S RESPONSES AND ADDENDA:** The City, at its discretion, may respond to any or all questions submitted in writing via the City's eBidding web site in the **form of an addendum**. No other responses to questions, oral or written shall be of any force or effect with respect to this solicitation. The changes to the Contract Documents through addenda are made effective as though originally issued with the Bid. The Bidders shall acknowledge the receipt of Addenda at the time of bid submission.
10. **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.
11. **CONTRACT PRICING:** This solicitation is for a Lump Sum contract with Unit Price provisions as set forth herein. The Bidder agrees to perform construction services for the City of San Diego in accordance with these contract documents for the prices listed below. The Bidder further agrees to guarantee the Contract Price for a period of 120 days from the date of Bid opening. The duration of the Contract Price guarantee may be extended, by mutual consent of the parties, by the number of days required for the City to obtain all items necessary to fulfill all contractual conditions.
12. **SUBCONTRACTOR INFORMATION:**
- 12.1. **LISTING OF SUBCONTRACTORS.** In accordance with the requirements provided in the "Subletting and Subcontracting Fair Practices Act" of the California Public Contract Code, the Bidder shall provide the **NAME** and **ADDRESS** of each Subcontractor who will perform work, labor, render services or who specially fabricates and installs a portion [type] of the work or improvement, in an amount in excess of 0.5% of the Contractor's total Bid. The Bidder shall also state within the description, whether the

subcontractor is a **CONSTRUCTOR, CONSULTANT** or **SUPPLIER**. The Bidder shall state the **DIR REGISTRATION NUMBER** for all subcontractors and shall further state within the description, the **PORTION** of the work which will be performed by each subcontractor under this Contract. The Contractor shall list only one Subcontractor for each portion of the Work. The **DOLLAR VALUE** of the total Bid to be performed shall be stated for all subcontractors listed. Failure to comply with this requirement may result in the Bid being rejected as **non-responsive** and ineligible for award. The Bidder's attention is directed to the Special Provisions - Section 3-2, "SELF- PERFORMANCE", 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.

Additionally, pursuant to California Senate Bill 96 and in accordance with the requirements of Labor Code sections 1771.1 and 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 California Department of Industrial Relations (DIR). **The Bidder shall provide the name, address, license number, DIR registration number of any Subcontractor - regardless of tier** - who will perform work, labor, render services or specially fabricate and install a portion [type] of the work or improvement pursuant to the contract.

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

12.3. 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.

13. SUBMITTAL OF "OR EQUAL" ITEMS: See Section 4-6, "Trade Names" in The WHITEBOOK and as amended in the SSP.

14. AWARD:

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

14.2. 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.

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

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

16. 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.

17. 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.

18. 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.

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

19.1. 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.

- 19.2. 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.
- 19.3. 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.
- 19.4. 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.
- 19.5. 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 shall cause the bid to be rejected and deemed **non-responsive**.

20. AWARD OF CONTRACT OR REJECTION OF BIDS:

- 20.1. This contract may be awarded to the lowest responsible and reliable Bidder.
- 20.2. Bidders shall complete ALL eBid forms as required by this solicitation. Incomplete eBids will not be accepted.
- 20.3. The City reserves the right to reject any or all Bids, to waive any informality or technicality in Bids received, and to waive any requirements of these specifications as to bidding procedure.
- 20.4. Bidders will not be released on account of their errors of judgment. Bidders may be released only upon receipt by the City within 3 Working Days of the bid opening, written notice from the Bidder which shows proof of honest, credible, clerical error of a material nature, free from fraud or fraudulent intent; and of evidence that reasonable care was observed in the preparation of the Bid.
- 20.5. A bidder who is not selected for contract award may protest the award of a contract to another bidder by submitting a written protest in accordance with the San Diego Municipal Code.

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

21. BID RESULTS:

- 21.1.** 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.
- 21.2.** To obtain the bid results, view the results on the City's web site, or request the results by U.S. mail and provide a self-addressed, stamped envelope. If requesting by mail, be sure to reference the bid name and number. The bid tabulations will be mailed to you upon their completion. The results will not be given over the telephone.

22. THE CONTRACT:

- 22.1.** 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.
- 22.2.** 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.
- 22.3.** 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.
- 22.4.** 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.

22.5. 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 by 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.

23. 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 3-9, "TECHNICAL STUDIES AND SUBSURFACE DATA", 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.

24. CITY STANDARD PROVISIONS: This contract is subject to the following standard provisions. See The WHITEBOOK for details.

24.1. The City of San Diego Resolution No. R-277952 adopted on May 20, 1991 for a Drug-Free Workplace.

24.2. The City of San Diego Resolution No. R-282153 adopted on June 14, 1993 related to the Americans with Disabilities Act.

24.3. The City of San Diego Municipal Code §22.3004 for Contractor Standards.

24.4. The City of San Diego's Labor Compliance Program and the State of California Labor Code §§1771.5(b) and 1776.

24.5. 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.

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

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

25. PRE-AWARD ACTIVITIES:

25.1. 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**.

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

PERFORMANCE BOND, LABOR AND MATERIALMEN'S BOND

FAITHFUL PERFORMANCE BOND AND LABOR AND MATERIALMEN'S BOND:

Marcon Engineering, Inc., a corporation, as principal, and
Arch 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
Two Million Two Hundred Fourty Thousand Eight Hundred Eighty Eight Dollars and Zero cents
(\$2,248,888.00) for the faithful performance of the annexed contract, and in the sum of Two Million
Two Hundred Fourty Eight Thousand Eight Hundred Eighty Eight Dollars and Zero cents
(\$2,248,888.00) for the benefit of laborers and materialmen designated below.

Conditions:

If the Principal shall faithfully perform the annexed contract with the City of San Diego, California, then the obligation herein with respect to a faithful performance shall be void; otherwise it shall remain in full force.

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

The obligation herein with respect to laborers and materialmen shall inure to the benefit of all persons, firms and corporations entitled to file claims under the provisions of Article 2. Claimants, (iii) public works of improvement commencing with Civil Code Section 9100 of the Civil Code of the State of California.

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

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

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

Dated February 28, 2020

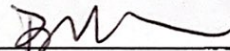
Approved as to Form

MarCon Engineering, Inc.
Principal

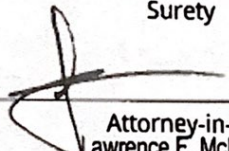
By 

Marjory Contreras
Printed Name of Person Signing for Principal

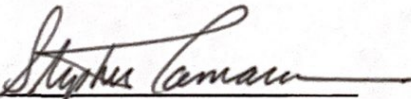
Mara W. Elliott, City Attorney

By 
Deputy City Attorney

Arch Insurance Company
Surety

By 
Attorney-in-fact
Lawrence F. McMahon

Approved:

By 
Stephen Samara
Principal Contract Specialist
Public Works Department

865 South Figueroa Street, Ste. 2700
Local Address of Surety

Los Angeles, CA 90017
Local Address (City, State) of Surety

213-283-3500
Local Telephone No. of Surety

Premium \$ 23,989.00
Subject to Adjustment Based on Final Contract Price

Bond No. SU1126913

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT Civil Code § 1189

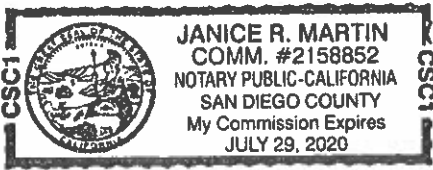
A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document, to which this certificate is attached, and not the truthfulness, accuracy or validity of that document.

STATE OF CALIFORNIA

County of San Diego

On FEB 28 2020 before me, Janice R. Martin, Notary Public,
Date Insert Name of Notary exactly as it appears on the official seal

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



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

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

Witness my hand and official seal.

Signature [Handwritten Signature]
Signature of Notary Public Janice R. Martin

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: _____

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

Signer is Representing: _____

Surety Company

Signer's Name: _____

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

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

Signer is Representing: _____

In Testimony Whereof, the Company has caused this instrument to be signed and its corporate seal to be affixed by their authorized officers, this 11th day of June, 2018.

Attested and Certified

Arch Insurance Company

Patrick K. Nails
Patrick K. Nails, Secretary

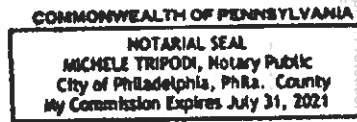


David M. Finkelstein
David M. Finkelstein, Executive Vice President

STATE OF PENNSYLVANIA SS

COUNTY OF PHILADELPHIA SS

I, Michele Tripodi, a Notary Public, do hereby certify that Patrick K. Nails and David M. Finkelstein personally known to me to be the same persons whose names are respectively as Secretary and Executive Vice President of the Arch Insurance Company, a Corporation organized and existing under the laws of the State of Missouri, subscribed to the foregoing instrument, appeared before me this day in person and severally acknowledged that they being thereunto duly authorized signed, sealed with the corporate seal and delivered the said instrument as the free and voluntary act of said corporation and as their own free and voluntary acts for the uses and purposes therein set forth.



Michele Tripodi
Michele Tripodi, Notary Public
My commission expires 07/31/2021

CERTIFICATION

I, Patrick K. Nails, Secretary of the Arch Insurance Company, do hereby certify that the attached Power of Attorney dated June 11, 2018 on behalf of the person(s) as listed above is a true and correct copy and that the same has been in full force and effect since the date thereof and is in full force and effect on the date of this certificate; and I do further certify that the said David M. Finkelstein, who executed the Power of Attorney as Executive Vice President, was on the date of execution of the attached Power of Attorney the duly elected Executive Vice President of the Arch Insurance Company.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the corporate seal of the Arch Insurance Company on this _____ day of FEB 28 2020, 20_____.

Patrick K. Nails
Patrick K. Nails, Secretary

This Power of Attorney limits the acts of those named therein to the bonds and undertakings specifically named therein and they have no authority to bind the Company except in the manner and to the extent herein stated.

PLEASE SEND ALL CLAIM INQUIRIES RELATING TO THIS BOND TO THE FOLLOWING ADDRESS:

Arch Insurance – Surety Division
3 Parkway, Suite 1500
Philadelphia, PA 19102



00ML0013 00 03 03
Kant' Kopy / K1
Security Paper
Hidden Pantograph
Color Match
Artificial Watermark
Anti-Copy Coin Rub
Anti-Coin Rub
Erasure Protection
Security Features Box
Microprint Protection
Acid Free

Kant' Kopy / K1
Security Paper
Hidden Pantograph
Color Match
Artificial Watermark
Anti-Copy Coin Rub
Erasure Protection
Security Features Box
Microprint Protection
Acid Free

MARCON ENGINEERING INC. LETTER OF TRANSMITTAL

Building & General Engineering Contractors
Contractors License #631811
876 North Broadway, Escondido, CA 92025
Phone: 760 737-8440 Fax: 760 737-8461

Transmittal No. 001

City of San Diego
Public Works Contracts
525 B STREET. Suite 750, MS 908A
San Diego, CA 92101

Date: 03/02/2020	CONTRACT # K-20-1815-DBB-3-A
Attention: Juan E Espindola	
PROJECT NAME: Balboa Park Bud Kearns Aquatic Complex Improvements	

WE ARE SENDING YOU Attached Under separate cover via _____ the following items:
 Shop drawings Prints Plans Samples
 Copy of letter Change order Submittal Certified's Payroll _____

ORIGINAL	DATE	COPY	DESCRIPTION
1	3/2/2020	0	Payment & Performance bonds for the above reference project.

THESE ARE TRANSMITTED as checked below:

<input type="checkbox"/> For approval	<input type="checkbox"/> Approved as submitted	<input type="checkbox"/> Resubmit _____ copies for approval
<input type="checkbox"/> For your use	<input type="checkbox"/> Approved as noted	<input type="checkbox"/> Submit _____ copies for distribution
<input checked="" type="checkbox"/> As requested	<input type="checkbox"/> Returned for corrections	<input type="checkbox"/> Return _____ corrected prints
<input type="checkbox"/> For review and comment	<input type="checkbox"/> _____	
<input type="checkbox"/> FOR BIDS DUE _____	200 _____	<input type="checkbox"/> PRINTS RETURNED AFTER LOAN TO US

REMARKS _____

COPY TO _____

SIGNED: Nathalia Arias

If enclosures are not as noted, kindly notify us at once.

PERFORMANCE BOND, LABOR AND MATERIALMEN'S BOND

FAITHFUL PERFORMANCE BOND AND LABOR AND MATERIALMEN'S BOND:

_____ Marcon Engineering, Inc. _____, a corporation, as principal, and
_____, 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
Two Million Two Hundred Fourty Eight Thousand Eight Hundred Eighty Eight Dollars and Zero cents
(\$2,248,888.00) for the faithful performance of the annexed contract, and in the sum of Two Million
Two Hundred Fourty Eight Thousand Eight Hundred Eighty Eight Dollars and Zero cents
(\$2,248,888.00) for the benefit of laborers and materialmen designated below.

Conditions:

If the Principal shall faithfully perform the annexed contract with the City of San Diego, California, then the obligation herein with respect to a faithful performance shall be void; otherwise it shall remain in full force.

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

The obligation herein with respect to laborers and materialmen shall inure to the benefit of all persons, firms and corporations entitled to file claims under the provisions of Article 2. Claimants, (iii) public works of improvement commencing with Civil Code Section 9100 of the Civil Code of the State of California.

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

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

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

Dated _____

Approved as to Form

Principal

By _____

Printed Name of Person Signing for Principal

Mara W. Elliott, City Attorney

By _____
Deputy City Attorney

Surety

By _____
Attorney-in-fact

Approved:

Local Address of Surety

By Stephen Samara
Principal Contract Specialist
Public Works Department

Local Address (City, State) of Surety

Local Telephone No. of Surety

Premium \$ _____

Bond No. _____

ATTACHMENTS

ATTACHMENT A
SCOPE OF WORK

SCOPE OF WORK

- 1. SCOPE OF WORK:** The Balboa Park Bud Kearns Aquatic Complex Improvements Project, located in Morley Field area of Balboa Park, will upgrade the historic facility to meet the latest Department of Health Services requirements and the Accessibility standards. The scope of work consists of the following upgrades:

Swimming pool upgrades which includes new swimming pool recirculation system, overflow recovery gutter system, pool inlets and returns replacement, pool stairs replacement, risers, handrails, deck edging and surface replacement and compliant pool markings.

Mechanical upgrades which includes new sub-grade surge chamber, new steam boiler, installation of new exhaust system in the chemical storage areas, and new filter.

Accessibility upgrades which includes ADA path of travel leading from the parking area to the pool deck, showers, toilets, drinking fountain replacement and locker rooms including signage.

Site upgrades which includes perimeter fencing, gates and lights.

- 1.1.** The Work shall be performed in accordance with:

- 1.1.1.** The Notice Inviting Bids and Plans numbered **40665-01-D** through **40665-54-D**, inclusive.

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

Balboa Park: 2229 Morley Field Drive, San Diego, CA 92104.

- 3. CONTRACT TIME:** The Contract Time for completion of the Work shall be **220 Working Days.**

ATTACHMENT B

RESERVED

ATTACHMENT C

RESERVED

ATTACHMENT D
PREVAILING WAGE

PREVAILING WAGE

1. **PREVAILING WAGE RATES:** Pursuant to San Diego Municipal Code section 22.3019, construction, alteration, demolition, repair and maintenance work performed under this Contract is subject to State prevailing wage laws. For construction work performed under this Contract cumulatively exceeding \$25,000 and for alteration, demolition, repair and maintenance work performed under this Contract cumulatively exceeding \$15,000, the Contractor and its subcontractors shall comply with State prevailing wage laws including, but not limited to, the requirements listed below.
 - 1.1. **Compliance with Prevailing Wage Requirements.** Pursuant to sections 1720 through 1861 of the California Labor Code, the Contractor and its subcontractors shall ensure that all workers who perform work under this Contract are paid not less than the prevailing rate of per diem wages as determined by the Director of the California Department of Industrial Relations (DIR). This includes work performed during the design and preconstruction phases of construction including, but not limited to, inspection and land surveying work.
 - 1.1.1. Copies of such prevailing rate of per diem wages are on file at the City and are available for inspection to any interested party on request. Copies of the prevailing rate of per diem wages also may be found at <http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm>. Contractor and its subcontractors shall post a copy of the prevailing rate of per diem wages determination at each job site and shall make them available to any interested party upon request.
 - 1.1.2. The wage rates determined by the DIR refer to expiration dates. If the published wage rate does not refer to a predetermined wage rate to be paid after the expiration date, then the published rate of wage shall be in effect for the life of this Contract. If the published wage rate refers to a predetermined wage rate to become effective upon expiration of the published wage rate and the predetermined wage rate is on file with the DIR, such predetermined wage rate shall become effective on the date following the expiration date and shall apply to this Contract in the same manner as if it had been published in said publication. If the predetermined wage rate refers to one or more additional expiration dates with additional predetermined wage rates, which expiration dates occur during the life of this Contract, each successive predetermined wage rate shall apply to this Contract on the date following the expiration date of the previous wage rate. If the last of such predetermined wage rates expires during the life of this Contract, such wage rate shall apply to the balance of the Contract.
 - 1.2. **Penalties for Violations.** Contractor and its subcontractors shall comply with California Labor Code section 1775 in the event a worker is paid less than the prevailing wage rate for the work or craft in which the worker is employed. This shall be in addition to any other applicable penalties allowed under Labor Code sections 1720 – 1861.

- 1.3. Payroll Records.** Contractor and its subcontractors shall comply with California Labor Code section 1776, which generally requires keeping accurate payroll records, verifying and certifying payroll records, and making them available for inspection. Contractor shall require its subcontractors to also comply with section 1776. Contractor and its subcontractors shall submit weekly certified payroll records online via the City's web-based Labor Compliance Program. Contractor is responsible for ensuring its subcontractors submit certified payroll records to the City.
- 1.3.1.** Contractor and their subcontractors shall also furnish records specified in Labor Code section 1776 directly to the Labor Commissioner in the manner required by Labor Code section 1771.4.
- 1.4. Apprentices.** Contractor and its subcontractors shall comply with California Labor Code sections 1777.5, 1777.6 and 1777.7 concerning the employment and wages of apprentices. Contractor is held responsible for the compliance of their subcontractors with sections 1777.5, 1777.6 and 1777.7.
- 1.5. Working Hours.** Contractor and their subcontractors shall comply with California Labor Code sections 1810 through 1815, including but not limited to: (i) restrict working hours on public works contracts to eight hours a day and forty hours a week, unless all hours worked in excess of 8 hours per day are compensated at not less than 1½ times the basic rate of pay; and (ii) specify penalties to be imposed on contractors and subcontractors of \$25 per worker per day for each day the worker works more than 8 hours per day and 40 hours per week in violation of California Labor Code sections 1810 through 1815.
- 1.6. Required Provisions for Subcontracts.** Contractor shall include at a minimum a copy of the following provisions in any contract they enter into with a subcontractor: California Labor Code sections 1771, 1771.1, 1775, 1776, 1777.5, 1810, 1813, 1815, 1860 and 1861.
- 1.7. Labor Code Section 1861 Certification.** Contractor in accordance with California Labor Code section 3700 is required to secure the payment of compensation of its employees and by signing this Contract, Contractor certifies that "I am aware of the provisions of Section 3700 of the California Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this Contract."
- 1.8. Labor Compliance Program.** The City has its own Labor Compliance Program authorized in August 2011 by the DIR. The City will withhold contract payments when payroll records are delinquent or deemed inadequate by the City or other governmental entity, or it has been established after an investigation by the City or other governmental entity that underpayment(s) have occurred. For questions or assistance, please contact the City of San Diego's Prevailing Wage Unit at 858-627-3200.

- 1.9. Contractor and Subcontractor Registration Requirements.** This project is subject to compliance monitoring and enforcement by the DIR. A contractor or subcontractor shall not be qualified to bid on, be listed in a bid or proposal, subject to the requirements of section 4104 of the Public Contract Code, or engage in the performance of any contract for public work, unless currently registered and qualified to perform public work pursuant to Labor Code section 1725.5. It is not a violation of this section for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the Business and Professions code or by Section 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Section 1725.5 at the time the contract is awarded.
- 1.9.1.** A Contractor's inadvertent error in listing a subcontractor who is not registered pursuant to Labor Code section 1725.5 in response to a solicitation shall not be grounds for filing a bid protest or grounds for considering the bid non-responsive provided that any of the following apply: (1) the subcontractor is registered prior to bid opening; (2) within twenty-four hours after the bid opening, the subcontractor is registered and has paid the penalty registration fee specified in Labor Code section 1725.5; or (3) the subcontractor is replaced by another registered subcontractor pursuant to Public Contract Code section 4107.
- 1.9.2.** By submitting a bid or proposal to the City, Contractor is certifying that he or she has verified that all subcontractors used on this public work project are registered with the DIR in compliance with Labor Code sections 1771.1 and 1725.5, and Contractor shall provide proof of registration for themselves and all listed subcontractors to the City at the time of bid or proposal due date or upon request.
- 1.10. Stop Order.** For Contractor or its subcontractors engaging in the performance of any public work contract without having been registered in violation of Labor Code sections 1725.5 or 1771.1, the Labor Commissioner shall issue and serve a stop order prohibiting the use of the unregistered contractors or unregistered subcontractor(s) on ALL public works until the unregistered contractor or unregistered subcontractor(s) is registered. Failure to observe a stop order is a misdemeanor.
- 1.11. List of all Subcontractors.** The Contractor shall provide the list of subcontractors (regardless of tier), along with their DIR registration numbers, utilized on this Contract prior to any work being performed; and the Contractor shall provide a complete list of all subcontractors with each invoice. Additionally, Contractor shall provide the City with a complete list of all subcontractors (regardless of tier) utilized on this contract within ten working days of the completion of the contract, along with their DIR registration numbers. The City shall withhold final payment to Construction Management Professional until at least thirty (30) days after this information is provided to the City.

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

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

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

1.12.3. List of all Subcontractors. The Contractor shall not be required to hire only registered subcontractors and is exempt from submitting the list of all subcontractors that is required in section 1.11 above. (Labor code section 1773.3).

ATTACHMENT E
SUPPLEMENTARY SPECIAL PROVISIONS

SUPPLEMENTARY SPECIAL PROVISIONS

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

1. The **2018 Edition** of the Standard Specifications for Public Works Construction (The "GREENBOOK").
2. The **2018 Edition** of the City of San Diego Standard Specifications for Public Works Construction (The "WHITEBOOK"), including the following:
 - a) General Provisions (A) for all Construction Contracts.

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

1-2 TERMS AND DEFINITIONS. To the "WHITEBOOK", items 43, 56, 69, and 102, DELETE in its entirety and SUBSTITUTE with the following:

43. **Field Order** - A Field Order is a written agreement by the Engineer to compensate you for Work items in accordance with 2-8, "EXTRA WORK" or 2-9, "CHANGED CONDITIONS". A Field Order does not change the Contract Price, Contract Time, or the scope intent of the Contract.
56. **Notice of Completion (NOC)** - A document recorded with the County of San Diego to signify that the Contract Work has been completed and accepted by the City.
69. **Punchlist** - A list of items of Work or corrections generated after a Walk-through that is conducted when you consider that the Work and Services are complete, and as verified by the Owner. The Punchlist may be completed in phases if defined in the Contract.
102. **Walk-through** - The procedure the City uses to evaluate the status of the Project or the phase of the Project and to generate a Punchlist prior to Acceptance.

To the "WHITEBOOK", item 54, "Normal Working Hours", ADD the following:

The **Normal Working Hours** are **7:00 AM to 3:30 PM**.

To the "WHITEBOOK", ADD the following:

108. **Substantial Completion** – When all Contract Work is deemed complete by the Contractor in writing, and as verified by the Owner. Substantial Completion may be completed in phases if defined in the Contract.

109. **Acceptance of Work** – When all of the Contract work is deemed officially complete, including all Punchlist items, by the Owner.
110. **Occupancy** – When the Owner deems a building is ready for use, the Owner will issue a certificate of Occupancy in writing.

SECTION 2 – SCOPE OF THE WORK

2-2 PERMITS, FEES AND NOTICES. To the “WHITEBOOK”, ADD the following:

2. The allowance bid item for “Building Permits” shall also include but is not limited to the following permits:
 - a) Building
 - b) Demolition/Removal
 - c) Department of Environmental Health
 - d) Shoring (if applicable)

SECTION 3 – CONTROL OF THE WORK

3-2 SELF-PERFORMANCE. To the “GREENBOOK”, DELETE in its entirety and SUBSTITUTE with the following:

1. You shall perform, with your own organization, Contract Work amounting to at least **30%** of the Base Bid.

3-9 TECHNICAL STUDIES AND SUBSURFACE DATA. To the “WHITEBOOK”, ADD the following:

5. In preparation of the Contract Documents, the designer has relied upon the following reports of explorations and tests at the Work Site:
 - a) Structural Calculations for Pool
 - b) Structural Calculations for Building and Site
 - c) Structural Calculations for HVAC Equipment and Duct Supports
6. The reports listed above are available for review at the following link:

[Structural Calculations](#)

3-10 SURVEYING. To the "GREENBOOK", DELETE in its entirety and SUBSTITUTE with the following:

3-10 SURVEYING.

1. You shall locate and mark all features related to the building and site, including landscaping and hardscape, using industry standard contractor's construction tools.
2. You shall preserve construction survey stakes, control points, and other survey related marks described in 3-10.1, "Survey Services Provided by the City" for the duration of the Project. If any construction survey stakes are lost or disturbed and need to be replaced, such replacement shall be performed by the City at your expense.

3-10.1 Survey Services Provided by the City.

1. The City will provide surveying services and on-site survey staking for the following:
 - a) Locations of any property lines, boundaries, or easement surveys within the project boundaries as required by the project.
 - b) Locations of up to four corners per building.
 - c) Verification of building pad finish surface elevation.
 - d) A maximum of 4 site control points.
 - e) Location and perpetuation of survey monuments within the project boundary in accordance with 400-2, "Permanent Survey Markers".
2. Notify the Resident Engineer in writing at least 2 Working Days prior to requesting survey services provided by the City.

3-10.2 Line and Grade.

1. The Work shall conform to the lines, elevations, and grades shown on the Plans. Three consecutive points set on the same slope shall be used together so that any variation from a straight grade can be detected. Any such variation shall be reported to the Engineer. In the absence of such report, you shall be responsible for any error in the grade of the Work.
2. Grades for underground conduits will be set at the surface of the ground. You shall transfer them to the bottom of the trench.

3-10.3 Payment.

1. The payment for any incidental survey services Work shall be included in the Contract Price.

3-12.4.3 Storage and Staging Areas. To the "WHITEBOOK", ADD the following:

4. The contractor shall coordinate with Park and Recreation Staff and the Pool Manager prior to the start of construction for the approval of laydown or staging areas.

3-13.1 Completion. To the "GREENBOOK", DELETE in its entirety and SUBSTITUTE with the following:

1. You shall submit a written assertion that the Work has been completed and is ready for Owner Acceptance. If, in the Engineer's judgment, the Work has been completed in accordance with the Contract Documents, the Engineer will set forth in writing the date the Work was completed. This will be the date that you are relieved from responsibility to protect and maintain the Work and to which liquidated damages will be computed.

3-13.1.1 Requirements Before Requesting a Walk-through. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

3-13.1.1 Requirements Before Requesting Substantial Completion.

1. The following items are required prior to requesting a Substantial Completion:
 - a) Remove temporary facilities from the Site.
 - b) Thoroughly cleaning the Site and removing all mark outs and construction staking.
 - c) Provide completed and signed Red-lines in accordance with 3-7.3 "Redlines and Record Documents".
 - d) Provide all material and equipment maintenance and operation instructions and/or manuals.
 - e) Provide all tools which are permanent parts of the equipment installed in the Project.
 - f) Provide and properly identify all keys for construction and all keys for permanent Work.
 - g) Provide all final Special Inspection reports required by the applicable building Code.
 - h) Provide all items specified to be supplied as extra stock. Wrap, seal, or place in a container all items as necessary to allow for storage by the City for future use. Verify the specified quantities.
 - i) Ensure that all specified EOCP and certified wage rate documentations covering the Contract Time have been submitted.
 - j) Provide the spare parts for the proposed irrigation system as specified in the Special Provisions.

- k) If the Work includes sewer and storm drain installations, the inspection shall include televising in accordance with 306-18, "VIDEO INSPECTION".
- l) If the Work includes a Plant Establishment Period, Work in accordance with 801-6, "MAINTENANCE AND PLANT ESTABLISHMENT" shall be completed prior to requesting Substantial Completion, unless approved otherwise by the Owner.
- m) Notify the Engineer to arrange a final inspection of permanent BMPs installed.

3-13.1.2 Walk-through and Punchlist Procedure. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

1. You shall notify the Engineer 15 Working Days in advance of date of anticipated Substantial Completion to allow time for Engineer to schedule a Walk-through. After you complete the requirements in 3-13.1.1, "Requirements Before Requesting Substantial Completion" and when you consider that the Work is Substantially Complete, you will notify the Engineer in writing that the Project is Substantially Complete. The Engineer will review your request and determine if the Project is ready for a Walk-through, by verifying whether you have completed all items as required by 3-13.1.1, "Requirements Before Requesting Substantial Completion". Within 7 Working Days, the City will either reject your request of a Walk-through in writing or schedule a Walk-through inspection. The Engineer shall facilitate the Walk-through.
2. The following documents shall be provided at the time of your Walk-through request: As-Built markup, Plans, specifications, technical data such as submittals and equipment manuals, draft final payment, warranties, material certifications, bonds, guarantees, maintenance service agreements, and maintenance and operating manuals.
3. Written warranties, except manufacturer's standard printed warranties, shall be on a letterhead addressed to you. Warranties shall be submitted in the format described in this section, modified as approved by the City, to suit the conditions pertaining to the warranty. Lack of submitting these items will delay start of Walk-through.
4. The Engineer will provide you with the Punchlist within 15 Working Days after the date of the Walk-through. The City shall not provide a preliminary Punchlist.
5. If the Engineer finds that the Project is not Substantially Complete as defined herein, the Engineer will terminate the Walk-through and notify you in writing.
6. If, at any time during the Engineer's evaluation of the corrective Work required by the Punchlist, the Engineer discovers that additional corrective Work is required, the Engineer may include that corrective Work in the Punchlist.

7. You shall remain solely responsible for the Project Site until the Project is completely operational, all Punchlist items have been corrected, and all operation and maintenance manuals have been accepted by the City.
8. The Engineer shall meet with you until all Punchlist items are corrected. You shall complete the Punchlist within 30 Working Days, and Working Days will continue to be counted until Acceptance of the Project.

3-13.2 Acceptance. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

1. You shall provide the completed, signed, and stamped DS-563 to the Engineer prior to Acceptance.
2. You shall deliver the final As-builts and final billing prior to Acceptance.
3. You shall assemble and deliver to the Engineer a Final Summary Report and Affidavit of Disposal prior to Acceptance.
4. Acceptance shall occur after all of the requirements contained in the Contract Documents have been fulfilled. If, in the Engineer's judgment, you have fully performed the Contract, the Engineer will recommend to the City Engineer that your performance of the Contract be accepted. You shall receive notification of Acceptance in writing from the Owner and counting of working days shall cease and Warranty begins.
5. Retention can be released 35 Calendar Days after NOC. Submit your request for retention to the Resident Engineer and they will mail to you a "Release of Claims" form which shall be completed and returned before the retention will be released.

3-13.3 Warranty. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

1. You shall warranty and repair all defective materials and workmanship for a period of 1 year. This call back warranty period shall start on the date the Work was accepted by the City unless the City has Beneficial Use or takes Occupancy of the project earlier (excluding water, sewer, and storm drain projects).
2. You shall warranty the Work free from all latent defects for 10 years and patent defects for a period of 4 years.
3. The warranty period for specific items covered under manufacturers' or suppliers' warranties shall commence on the date they are placed into service at the direction of the Engineer in writing.
4. All express warranties from Subcontractors, manufacturers', or Suppliers', of any tier, for the materials furnished and Work performed shall be assigned, in writing, to the City, and shall be delivered to the Engineer prior to the Acceptance of your performance of the Contract.

5. Replace or repair defective materials and workmanship in a manner satisfactory to the Engineer after notice to do so from the Engineer and within the time specified in the notice. If you fail to make such replacements or repairs within the time specified in the notice, the City may perform the replacement or repairs at your expense. If you fail to reimburse the City for the actual costs, your Surety shall be liable for the cost
6. Items that shall be warranted free from defective workmanship and materials for a period longer than 1 year are as follows:

Specified Item	Minimum Warranty Period
Detectable Warning Tile Construction	3 Years of Manufacturer's Warranty
All Work Under SECTION 500 – PIPELINE REHABILITATION	3 Years
Fiber Optic Interconnect Cables	2 Years
Luminaires*	10 Years of Manufacturer's Warranty
LED Signal Modules	3 Years of Manufacturer's Warranty
Field Devices Associated with 700-6.3, "Adaptive Control Note"	See 700-6.3.9, "Warranty"

* Provide documentation verifying that the induction luminaire models being offered for the Project are covered by the 10 year warranty.

7. You shall provide the City and property owner a copy of the manufacturer's warranty for private sewer pumps, including the alarm panel and all other accessories.
 - a) You shall involve the manufacturer in the installation and startup as needed to secure any extended warranty required.
 - b) Nothing in here is intended to limit any manufacturer's warranty which provides the City with greater warranty rights than set forth in this section or the Contract Documents.
 - c) The warranty shall include all components. The form of the warranty shall be approved by the Engineer in accordance with **3-13.3.2**, "Warranty Format Requirements".
8. If, during the warranty period, any item of the Work is found to be Defective Work, you shall correct it promptly after receipt of written notice from the City to do so. The warranty period shall be extended with respect to portions of the Work corrected as part of the warranty requirements.

SECTION 4 - CONTROL OF MATERIALS

4-2 PROTECTION. To the "WHITEBOOK", ADD the following:

2. For pool and any related equipment, the contractor shall coordinate with the City Parks & Recreation department staff to protect and/or relocate the equipment prior to the start of work in the Bud Kearns swimming pool.

4-3.4 Specialty Inspection Paid for by the Contractor. To the "WHITEBOOK", ADD the following:

2. The specialty inspections required shall include ALL but not limited to the following:
 - a) Refer to plan sheet **40665-25-D**, General Structural Notes and Abbreviations
 - b) Department of Environmental Health inspections.
3. The contractor shall hire a licensed geotechnical engineer to perform specialty inspection of any geotechnical related requirements necessary for execution of work.

4-3.6 Preapproved Materials. To the "WHITEBOOK", ADD the following:

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

4-6 TRADE NAMES. To the "WHITEBOOK", ADD the following:

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

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

SECTION 5 – LEGAL RELATIONS AND RESPONSIBILITIES

5-4 INSURANCE. To the "GREENBOOK", DELETE in its entirety and SUBSTITUTE with the following:

5-4 INSURANCE.

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

5-4.1 Policies and Procedures.

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

Your failure to maintain or renew coverage or to provide evidence of renewal during the term of the Contract may be treated by the City as a material breach of the Contract.

5-4.2 Types of Insurance.

5-4.2.1 Commercial General Liability Insurance.

1. Commercial General Liability Insurance shall be written on the current version of the ISO Occurrence form CG 00 01 07 98 or an equivalent form providing coverage at least as broad.
2. The policy shall cover liability arising from premises and operations, XCU (explosions, underground, and collapse), independent contractors, products/completed operations, personal injury and advertising injury, bodily injury, property damage, and liability assumed under an insured's contract (including the tort liability of another assumed in a business contract).
3. There shall be no endorsement or modification limiting the scope of coverage for either "insured vs. insured" claims or contractual liability. You shall maintain the same or equivalent insurance for at least 10 years following completion of the Work.

4. All costs of defense shall be outside the policy limits. Policy coverage shall be in liability limits of not less than the following:

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

5-4.2.2 Commercial Automobile Liability Insurance.

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

5-4.2.5 Contractors Builders Risk Property Insurance.

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

paid for insured. The City shall be entitled to 100% of its loss. You shall pay the City any portion of that loss not covered because of a deductible at the same time the proceeds of the insurance are paid to the City as trustee.

5. Any insured, other than the City, making claim to which a deductible applies shall be responsible for 100% of the loss not insured because of the deductible. Except as provided for under California law, the policy or policies shall provide that the City is entitled to 30 Days prior written notice (10 Days for cancellation due to non-payment of premium) of cancellation or non-renewal of the policy or policies.

5-4.3 Rating Requirements. Except for the State Compensation Insurance Fund, all insurance required by this Contract as described herein shall be carried only by responsible insurance companies with a rating of, or equivalent to, at least "A-, VI" by A.M. Best Company, that are authorized by the California Insurance Commissioner to do business in the State, and that have been approved by the City.

5-4.3.1 Non-Admitted Carriers. The City will accept insurance provided by non-admitted, "surplus lines" carriers only if the carrier is authorized to do business in the State and is included on the List of Approved Surplus Lines Insurers (LASLI list).

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

5-4.4 Evidence of Insurance. Furnish to the City documents e.g., certificates of insurance and endorsements evidencing the insurance required herein, and furnish renewal documentation prior to expiration of this insurance.

Each required document shall be signed by the insurer or a person authorized by the insurer to bind coverage on its behalf. We reserve the right to require complete, certified copies of all insurance policies required herein.

5-4.5 Policy Endorsements.

5-4.5.1 Commercial General Liability Insurance.

5-4.5.1.1 Additional Insured.

1. You shall provide at your expense policy endorsement written on the current version of the ISO Occurrence form CG 20 10 11 85 or an equivalent form providing coverage at least as broad.
2. To the fullest extent allowed by law e.g., California Insurance Code §11580.04, the policy shall be endorsed to include the City and its respective elected officials, officers, employees, agents, and representatives as additional insured.

3. The additional insured coverage for projects for which the Engineer's Estimate is \$1,000,000 or more shall include liability arising out of:
 - a) Ongoing operations performed by you or on your behalf,
 - b) your products,
 - c) your Work, e.g., your completed operations performed by you or on your behalf, or
 - d) premises owned, leased, controlled, or used by you.
4. The additional insured coverage for projects for which the Engineer's Estimate is less than \$1,000,000 shall include liability arising out of:
 - a) Ongoing operations performed by you or on your behalf,
 - b) your products, or
 - c) premises owned, leased, controlled, or used by you.

5-4.5.1.2 Primary and Non-Contributory Coverage. The policy shall be endorsed to provide that the coverage with respect to operations, including the completed operations, if appropriate, of the Named Insured is primary to any insurance or self-insurance of the City and its elected officials, officers, employees, agents and representatives. Further, it shall provide that any insurance maintained by the City and its elected officials, officers, employees, agents and representatives shall be in excess of your insurance and shall not contribute to it.

5-4.5.1.3 Project General Aggregate Limit. The policy or policies shall be endorsed to provide a Designated Construction Project General Aggregate Limit that will apply only to the Work. Only claims payments which arise from the Work shall reduce the Designated Construction Project General Aggregate Limit.

The Designated Construction Project General Aggregate Limit shall be in addition to the aggregate limit provided for the products-completed operations hazard.

5-4.5.2 Commercial Automobile Liability Insurance.

5-4.5.2.1 Additional Insured. Unless the policy or policies of Commercial Auto Liability Insurance are written on an ISO form CA 00 01 12 90 or a later version of this form or equivalent form providing coverage at least as broad, the policy shall be endorsed to include the City and its respective elected officials, officers, employees, agents, and representatives as additional insured, with respect to liability arising out of automobiles owned, leased, hired or borrowed by you or on your behalf. This endorsement is limited to the obligations permitted by California Insurance Code §11580.04.

5-4.5.5 Builders Risk Endorsements.

5-4.5.5.1 Waiver of Subrogation. The policy or policies shall be endorsed to provide that the insurer will waive all rights of subrogation against the City, and its respective elected officials, officers, employees, agents, and representatives for losses paid under the terms of the policy or policies and which arise from Work performed by the Named Insured for the City.

5-4.5.5.2 Builders Risk – Partial Utilization. If the City desires to occupy or use a portion or portions of the Work prior to Acceptance in accordance with this Contract, the City will notify you and you shall immediately notify your Builder's Risk insurer and obtain an endorsement that the policy or policies shall not be cancelled or lapse on account of any such partial use or occupancy. You shall obtain the endorsement prior to the City's occupation and use.

5-4.6 Deductibles and Self-Insured Retentions. You shall pay for all deductibles and self-insured retentions. You shall disclose deductibles and self-insured retentions to the City at the time the evidence of insurance is provided.

5-4.7 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.

5-4.8 Notice of Changes to Insurance. You shall notify the City 30 Days prior to any material change to the policies of insurance provided under this Contract.

5-4.9 Excess Insurance. Policies providing excess coverage shall follow the form of the primary policy or policies e.g., all endorsements.

5-4.11 Workers' Compensation Insurance and Employers Liability Insurance.

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

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

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

5-4.11.1 Waiver of Subrogation. The policy or policies shall be endorsed to provide that the insurer will waive all rights of subrogation against the City and its respective elected officials, officers, employees, agents, and representatives for losses paid under the terms of the policy or policies and which arise from Work performed by the Named Insured for the City.

5-13 ELECTRONIC COMMUNICATION. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

1. Virtual Project Manager shall be used on this Contract.
2. You shall post all communications addressed to the Engineer concerning construction including RFIs, submittals, daily logs including the Weekly Statement of Working Days (WSWD), Storm Water, and transmittals to the Virtual Project Manager (VPM) website established for the Projects. This shall not supersede any Federal requirements.
3. Maintain a list of scheduled activities including planned and actual execution dates for all major construction activities and milestones defined in the approved Schedule.
4. Review and act on all communications addressed to you in the VPM project website.
5. A user's guide to the VPM system is available on the City's website and shall be provided to you at the Pre-construction Meeting. Refer to the VPM training videos and forms at the location below:
<https://www.sandiego.gov/publicworks/edocref>
6. Submit the Sensitive Information Authorization Acknowledgement Form and VPM User Agreement located in the VPM user's guide at the Pre-construction Meeting.

SECTION 6 – PROSECUTION AND PROGRESS OF THE WORK

6-1.1 Construction Schedule. To the "WHITEBOOK", item 1, subsection "s", DELETE in its entirety and SUBSTITUTE with the following:

- s) Submit an updated cash flow forecast with every pay request (for each Project ID or WBS number provided in the Contract) showing periodic and cumulative construction billing amounts for the duration of the Contract Time.

If there has been any Extra Work since the last update, include only the approved amounts.

- i. Refer to the Sample City Invoice materials in **Appendix D – Sample City Invoice with Cash Flow Forecast** and use the format shown.
- ii. See also the “Cash flow Forecast Example” at the location below:

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

To the “WHITEBOOK”, ADD the following:

2. From issuance of Notice to Proceed (NTP), Bud Kearns Pool will be closed to the public until further notice.
3. The Bud Kearns Pool must be reopened for public use during “pool peak” time from June 15 – September 15.

6-1.5.2 Excusable Non-Compensable Delays. To the “WHITEBOOK”, DELETE in its entirety and SUBSTITUTE with the following:

6-1.5.2 Excusable Non-Compensable and Concurrent Delays.

1. The City shall only issue an extension of time for Excusable Delays that meet the requirements of 6-4.2, “Extensions of Time” for the following circumstances:
 - a) Delays resulting from Force Majeure.
 - b) Delays caused by weather.
 - c) Delays caused by changes to County, State, or Federal law.
2. When a non-excusable delay is concurrent with an Excusable Delay, you shall not be entitled to an extension of Contract Time for the period the non-excusable delay is concurrent with the Excusable Delay.
3. When an Excusable Non-Compensable Delay is concurrent with an Excusable Compensable Delay, you shall be entitled to an extension of Contract Time, but shall not be entitled to compensation for the period the Excusable Non-Compensable Delay is concurrent with the Excusable Compensable Delay.

6-2.1 Moratoriums. To the “WHITEBOOK”, ADD the following:

3. Do not Work in the areas where there is currently a moratorium issued by the City. The areas subject to moratorium are listed below:
 - a) Swimming Pool Peak from June 15 to September 15 (inclusive).

6-4.2

Extensions of Time. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

1. The Contract Time shall not be modified except by Change Order.
2. You shall notify the City in writing within **1 Working Day** after the occurrence and discovery of an event that impacts the Project Schedule.
 - a) If you believe this event requires a Change Order, you shall submit a written Change Order request with a report to the City that explains the request for Change Order within **5 Working Days**. The Change Order request must include supporting data, a general description of the discovery, the basis for extension, and the estimated length of extension. The City may grant an extension of time, in writing, for the Change Order request if you require more time to gather and analyze data.
3. The Engineer shall not grant an extension of Contract Time in accordance with 6-1.5, "Excusable Delays" unless you demonstrate, through an analysis of the critical path, the following:
 - a) The event causing the delay impacted the activities along the Project's critical path.
 - b) The increases in the time to perform all or part of the Project beyond the Contract Time arose from unforeseeable causes beyond your control and without your fault or negligence and that all project float has been used.
4. Any modifications to the Contract Time will be incorporated into the weekly document that the Engineer issues that stipulates the Contract Time. If you do not agree with this document, submit to the Engineer for review a written protest supporting your objections to the document within **30 Calendar Days** after receipt of the statement. Your failure to file a timely protest shall constitute your acceptance of the Engineer's weekly document.
 - a) Your protest will be considered a claim for time extension and shall be subject to 2-10.1, "Claims".

6-4.4

Written Notice and Report. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

Your failure to notify the Resident Engineer within **1 Working Day** OR provide a Change Order request within **5 Working Days** after the event, in accordance with 6-4.2, "Extensions of Time", will be considered grounds for refusal by the City to consider such request if your failure to notify prejudices the City in responding to the event.

ADD:

6-6.1.1 Environmental Document.

1. The City of San Diego has prepared a **Notice of Exemption** for **Balboa Park Bud Kearns Aquatic Complex Improvements**, as referenced in the Contract Appendix. You shall comply with all requirements of the **Notice of Exemption** as set forth in **Appendix A**.
2. Compliance with the City's environmental document shall be included in the Contract Price.

SECTION 7 – MEASUREMENT AND PAYMENT

7-3.1 General. To the "WHITEBOOK" ADD the following:

3. The Lump Sum Bid item for "**Construction of Balboa Park Bud Kearns Aquatic Complex Improvements**" shall include payments for all work required as specified per plan sheets 40665-1-D through 40665-54-D, Technicals and other Contract Documents.
4. The payment for all lead abatement, handling, and disposal Work required per **Appendix G – Inspection Report Asbestos and Lead** shall be included in the allowance Bid item for "**Lead Paint Handling and Disposal**".

7-3.2 Partial and Final Payment. To the "GREENBOOK", paragraph (3), DELETE 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. Documentation for an escrow payment shall have an escrow agreement signed by you, the City, and the escrow agent. From each progress payment, no less than 5% will be deducted and deposited by the City into the escrow account. Upon completion of the Contract, the City will notify 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.

7-3.9 Field Orders. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

1. If the cumulative total of Field Order items of Work does not exceed the "Field Orders" Bid Item, the City shall pay those Field Orders as shown below:

**TABLE 7-3.9
FIELD ORDER LIMITS**

Contract Price	Maximum Field Order Work Amount
Less than \$100,001	\$2,500
\$100,001 to \$1,000,000	\$5,000
\$1,000,001 to \$5,000,000	\$10,000
\$5,000,001 to \$15,000,000	\$20,000
\$15,000,001 to \$30,000,000	\$40,000
Greater than \$30,000,000	\$50,000

2. Field Order items of Work for contracts greater than \$15,000,000 will require additional approvals from the City prior to its approval by the Resident Engineer.
3. The City will issue a Field Order only after the City's acceptance of the cost of the field order amount.
4. Field Orders shall not be used to add scope or to include extensions of time related to changes in work.
5. If in the event there is a change related to the critical path on the project which necessitates an extension of time and the change amount is within the Field Order limits shown on Table 7-3.9, then a Field Order can be issued to compensate you for the approved costs. Any extensions of time associated with the change shall be included in a subsequent Change Order and no additional compensation shall be granted as part of the change order for the extension of time.
6. The unused portions of Field Orders Bid item shall revert to the City upon Acceptance.

7-3.11 Compensation Adjustments for Price Index Fluctuations. To the "WHITEBOOK" ADD the following:

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

SECTION 400 - PROTECTION AND RESTORATION

400-1 **GENERAL.** To the "WHITEBOOK", ADD the following:

5. For pool and any related equipment, the contractor shall coordinate with the City Parks & Recreation department staff to protect and/or relocate the equipment prior to the start of work in the Bud Kearns swimming pool.

SECTION 600 – ACCESS

600-2 **VEHICULAR ACCESS.** To the "WHITEBOOK", ADD the following:

5. The contractor shall verify to the Park and Recreation Staff for vehicular access to the work site for delivery of materials and equipment intended for the project.

SECTION 1001 – CONSTRUCTION BEST MANAGEMENT PRACTICES (BMPs)

1001-1 **GENERAL.** To the "WHITEBOOK", ADD the following:

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

TECHNICALS

BUD KEARNS AQUATIC COMPLEX IMPROVEMENTS
2229 MORLEY FIELD DRIVE, SAN DIEGO, CA 92104

Division	Section Title
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SECTION 01 10 00 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Project information.
 - 2. Work covered by Contract Documents.
 - 3. Access to site.
 - 4. Coordination with occupants.
 - 5. Work restrictions.
 - 6. Specification and drawing conventions.
 - 7. Miscellaneous provisions.

- B. Related Requirements:

1.2 PROJECT INFORMATION

- A. Project Identification: Bud Kearns Aquatic Center Improvements.
 - 1. Project Location: 2229 Morley Field Drive, San Diego, CA 92104.

- B. Owner: City of San Diego.

- C. Project Manager: Michelle Garcia-Quilico, Architectural Engineering and Parks Division, 525 B St., Suite 750, MS# 908A, San Diego, CA 92101. (619) 533-6635.

- D. Architect Identification: The Contract Documents, dated December 20, 2016 were prepared for Project by: Platt/Whitelaw Architects, 4034 30th Street, San Diego, CA 92104. (619) 546-4326.

1.3 CONTRACT

- A. The Project will be constructed under a single prime contract.

1.4 ACCESS TO SITE

- A. General: Contractor shall have full use of Bud Kearns Aquatic Center for construction operations during construction period. Aquatic center building will be closed, however, offices on the second floor will remain operational. Contractor's use of Project site is limited and construction operations and storage must be coordinated with Resident Engineer prior to Construction.

- B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1.5 COORDINATION WITH OCCUPANTS

- A. Partial Owner Occupancy: City will occupy the premises (second floor offices) during the construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage.
 - 1. Maintain access to all adjacent park activity areas, and other used facilities. Do not close or obstruct walkways, or other occupied or used facilities without written permission from Resident Engineer.
 - 2. Provide not less than **72** hours' notice to Owner of activities that will affect Owner operations.

1.6 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to hours indicated in General Provisions. Exceptions to these hours include utility shutdowns and noisy activity.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by City or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than seven days in advance of proposed utility interruptions.
 - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Controlled Substances: Use of tobacco products and other controlled substances on Owner property is not permitted.

1.7 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 01 73 00 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Installation of the Work.
 - 2. Cutting and patching.
 - 3. Progress cleaning.
 - 4. Starting and adjusting.
 - 5. Protection of installed construction.
 - 6. Correction of the Work.

- B. Related Requirements:
 - 1. Section 01 10 00 "Summary" for limits on use of Project site.
 - 2. Section 02 41 19 "Selective Demolition" for demolition and removal of selected portions of the building.

1.2 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

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

1.3 INFORMATIONAL SUBMITTALS

- A. Cutting and Patching Notification: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
 - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 - 3. Products: List products to be used for patching and firms or entities that will perform patching work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems

that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

- a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
- B. Landfill Receipts: Submit copies of waste hauler slips indicating the amount of waste hauled in tons and the amount of waste in tons diverted from landfill and recycled, composted or salvaged.

1.4 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 1. Structural Elements: When cutting and patching structural elements, notify the Construction Manager of locations and details of cutting and await directions from the Construction Manager before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include but are not limited to the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Mechanical systems piping and ducts.
 - f. Control systems.
 - g. Communication systems.
 - h. Fire-detection and -alarm systems.
 - i. Conveying systems.
 - j. Electrical wiring systems.
 - k. Operating systems of special construction.
 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Sprayed fire-resistive material.
 - e. Equipment supports.
 - f. Piping, ductwork, vessels, and equipment.

- g. Noise- and vibration-control elements and systems.
- 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in the Construction Manager's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site to Construction Manager 10 days prior to start of work.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
1. Description of the Work.
 2. List of detrimental conditions, including substrates.
 3. List of unacceptable installation tolerances.
 4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect.

3.3 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by the Construction Manager.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.4 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 10 00 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

- a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
- a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.5 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
- 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
- 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

- D. **Installed Work:** Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. **Concealed Spaces:** Remove debris from concealed spaces before enclosing the space.
- F. **Exposed Surfaces in Finished Areas:** Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. **Waste Disposal:** Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in The "Whitebook".
- H. **During handling and installation,** clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. **Clean and provide maintenance on completed construction** as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

3.6 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.8 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 73 00

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

B. Related Requirements:

1. Section 011000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade improvements not part of selective demolition.

1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

1.3 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.4 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.

1.5 INFORMATIONAL SUBMITTALS

- A. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's building manager's on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- B. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations.

1.6 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.

2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
- E. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by 12 inches or more.
- F. Storage or sale of removed items or materials on-site is not permitted.
- G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 1. Maintain fire-protection facilities in service during selective demolition operations.

1.7 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective 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 selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.
 1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 1. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 2. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.

3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 1. Strengthen or add new supports when required during progress of selective demolition.

- C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 - 5. Maintain fire watch during and for at least two hours after flame-cutting operations.
 - 6. Maintain adequate ventilation when using cutting torches.
 - 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 - 9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 10. Dispose of demolished items and materials promptly.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- 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.
 - 1. Do not allow demolished materials to accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

3.7 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 033310 – STRUCTURAL AND CIVIL CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplemental Provisions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies cast-in-place Architectural concrete including form facings, reinforcement accessories, concrete materials, concrete mixture design, placement procedures, and finishes for cast in place concrete curbs, headers, walls, stairs, benches, site furnishings, footings and miscellaneous site concrete work.
- B. Related Sections include the following:
 - 1. Division 31 “Earthwork” Sections
 - 2. Division 32 Section “Asphalt Paving” for coordination with adjacent asphalt paving areas.

1.3 DEFINITIONS

- A. Cast-in-Place Architectural Concrete: All exterior formed concrete shown on the Landscape Plans except for walkways requiring special concrete materials, formwork, placement, or finishes to obtain specified Architectural appearance.
- B. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.
- C. Design Reference Sample: Sample provided by Architect reflects acceptable surface quality and appearance of cast-in-place Architectural concrete.
- D. Reveal: Projection of coarse aggregate from matrix or mortar after completion of exposure operations.

1.4 STANDARDS OF CONSTRUCTION

- A. ACI 214 – Recommended Practice for Evaluation of Strength Tests Results of Concrete.
- B. ACI 301 – Details and Detailing of Concrete Reinforcement.

- C. ACI 303.1 – Standard Specification for Cast-in-Place Architectural Concrete.
- D. ACI 304 – Recommended Practices for Measuring, Mixing, Transporting, and Placing of Concrete.
- E. ACI 305 – Recommended Practices for Cold Weather Concreting.
- F. ACI 306 – Recommended Practices for Hot Weather Concreting.
- G. ACI 308 – Standard Practice for Curing Concrete.
- H. ACI 347 – Recommended Practice for Concrete Formwork.
- I. ASTM A615 – Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- J. ASTM C33 – Standard Specification for Concrete Aggregates.
- K. ASTM C39 – Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- L. ASTM C94 – Standard Specification for Ready-Mix Concrete.
- M. ASTM C136 – Method for Sieve Analysis of Fine and Coarse Aggregate.
- N. ASTM C143 – Test Method for Slump of Portland Concrete Cement.
- O. ASTM C150 – Standard Specification for Portland Cement.
- P. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete.
- Q. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.
- R. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.
- S. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.
- T. ASTM C979 – Standard Specification for Pigments for Integrally Colored Concrete.
- U. ASTM C1193 – Standard Guide for Use of Joint Sealants.
- V. ASTM D1751 – Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-Extruding and Resilient Bituminous Types).
- W. National Ready Mix Concrete Association, latest revision: “Certificate of Conformance for Concrete Production Facilities”.

1.5 SUBMITTALS

- A. Product Data: Submit available Product/Material data, manufacturing source (name, address, and telephone number), and distributor source (name, address, and telephone number) for each type of material and product indicated:
1. Reinforcement and Forming Accessories
 2. Cementitious materials
 3. Aggregate materials (course and fine)
 4. Chemical Admixtures
 5. Concrete Curing materials
 6. Dowels
 7. Expansion joint filler material and joint sealant
 8. Finish retardant
 9. Integral color/ color admixture
 10. Concrete paving surface sealant
- B. Statement of Mix Design: Prepared by the batch plant servicing the Project, submit for each type or load delivered to Project. Include revised mix proportions when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments. Each Statement of Mix Design shall include following information:
1. Name, address, and telephone number of batch plant preparing Statement of Mix Design.
 2. Date of Mix Design.
 3. Project location.
 4. Contractor requesting load delivery.
 5. Mix Design Number.
 6. Admixtures (as required).
 7. Integral Color Admixtures (as required).
 8. Gradations for sand and aggregate.
 9. Material weights, specific gravity, and absolute volumes.
 10. Basis of testing, i.e. UBC 2605 D4 and CBC Title 24 2604 D4.
 11. Water/Cementitious Materials Ratio (W/CM Ratio).
 12. Slump.
 13. PSI Rating.
- C. Formwork Shop Drawings: Show formwork construction including form-facing joints, rustications, construction and contraction joints, form joint-sealant details, form tie locations and patterns, inserts and embedments, cutouts, cleanout panels, and other items that visually affect cast-in-place Architectural concrete.
- D. Installer Qualifications: Engage an experienced Installer who has completed concrete paving installations similar in material, design, and extent to that indicated for this Project, and whose work has resulted in construction with a record of successful in-service performance.
- E. Certification that Architect's Reference panels have been reviewed and that materials and processes provided will achieve intended effects indicated on Architect's Reference panel.

- F. Submittals for above items shall be made in one package. If submittals are judged incomplete or non-responsive to the directions of the Architect after three (3) submissions the Contractor shall be back charged for the Architect's costs to process additional Submittals.
- G. Field quality-control test reports.
- H. Minutes of preinstallation conference.
- I. Delivery slips.
- J. 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."
- K. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1.6 QUALITY ASSURANCE

- A. Source Limitations for Cast-in-Place Architectural Concrete: Obtain each color, size, type, and variety of concrete material and concrete mixture from one manufacturer with resources to provide cast-in-place Architectural concrete of consistent quality in appearance and physical properties.
- B. The total estimated requirement of architectural aggregate plus anticipated losses and waste shall be procured from one source of supply. The Contractor will assure that the source of supply is adequate to provide, throughout the duration of the project, an aggregate which is uniform in size, color and shape. Should an aggregate be elected in which there is doubt about the quantity of a uniform supply, the Contractor shall require the supplier to remove the entire amount from the pit, mine or river and thoroughly mix and stockpile said aggregate for exclusive use of this project.
- C. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1.7 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

1.8 DELIVERY AND HANDLING

- A. Conform to Division 01 "Product Requirements".

- B. Deliver, store, and handle reinforcement to prevent damage.

1.9 REGULATORY REQUIREMENTS

- A. Testing: Slump tests shall be taken to certify compliance with mix design. Slump shall be in accordance with ASTM C 143.
- B. Mix design shall be in accordance with ACI 211-6.
- C. Conform to applicable laws, codes, and regulations required by authorities having jurisdiction over the work.

1.10 SITE CONDITIONS

- A. Do not place concrete when subbase surface temperature is less than 40 degrees F, nor when surface is wet.

1.11 COORDINATION

- A. Ensure that irrigation sleeves, electrical conduit, food cart outlets, and other utility elements are accommodated and as-built located prior to pouring concrete.

1.12 INSPECTION OF SITE

- A. Verify conditions at site affect Work of this Section and take field measurements as required. Report major discrepancies between Drawings and field dimensions to Owner's Authorized Representative prior to commencing work.

PART 2 - PRODUCTS

2.1 FORMING MATERIALS

- A. All forms shall be new; no reused or reconditioned forms will be permitted. Forms for architectural concrete shall be built so that they are completely rigid, strong enough to withstand without deflection, movement or leakage, the high hydraulic pressures which result from rapid filling and heavy frequency vibration. All materials shall be new at start of work.
- B. Fasteners shall be formed galvanized steel or other approved non-corrosive steel materials.
- C. Forms for Board Form Finish Concrete: Units of face design, size, arrangement, and configuration indicated. Provide solid backing and form supports to ensure stability of textured form liners.
 - 1. Form work to be new, #2 grade Cedar, free of checks, bows, and cracks.

2. Place 16 penny nails at 24" o.c. between layers of individual boards to allow for some small irregular fins to form at the surface.
- D. Form-Facing Panels for As-Cast Finishes: Steel, glass-fiber-reinforced plastic, or other approved nonabsorptive panel materials that will provide continuous, true, and smooth Architectural concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - E. Form-Facing Panels for As-Cast Finishes: Exterior-grade plywood panels, nonabsorptive, that will provide continuous, true, and smooth Architectural concrete surfaces, high-density overlay, Class 1, or better, complying with DOC PS 1.
 - F. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will provide surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
 - G. Rustication Strips: Metal, rigid plastic, or dressed wood with sides beveled and back kerfed; nonstaining; in longest practicable lengths.
 - H. Form Joint Tape: Compressible foam tape; pressure sensitive; AAMA 800, "Specification 810.1, Expanded Cellular Glazing Tape"; minimum 1/4 inch (6 mm) thick.
 - I. Form Joint Sealant: Elastomeric sealant complying with ASTM C 920, Type M or S, Grade NS, that adheres to form joint substrates.
 - J. Form Sealer: Penetrating, clear, polyurethane wood form sealer formulated to reduce absorption of bleed water and prevent migration of set-retarding chemicals from wood.
 1. Acceptable Manufacturers:
 - a. W.R. Grace Company "Formfilm"
 - b. Nox-Crete Chemicals, Inc. "Pre-Form"
 - c. Hunt Process Co. "Seal Form-L"
 - K. Form-Release Agent: Commercially formulated colorless form-release agent that will not bond with, stain, or adversely affect Architectural concrete surfaces, that is compatible with the sealer and will not impair subsequent treatments of those surfaces.
 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
 2. Final acceptance of form release agent depends on proven performance on mock up panels.
 3. Acceptable Manufacturers:
 - a. Atlas Release

- b. Bio Release Agent, Burke, Edoco.
 - c. Enviroform, Conspec, Dayton Superior Company.
 - d. Bio-Release EF, Conspec, Dayton Superior Company.
 - e. Duogard II, W.R. Meadows, Inc.
 - f. Greenplus Form Release Agent ES, Greenland Corporation.
 - g. Soy Form Release and Natural Form Oil, Natural Soy, LLC.
 - h. SOYsolv Concrete Form Release Agent, SOYsolv.
 - i. Or equal.
- L. Surface Retarder: Spray-applied, ready-to-use, water-based solution with color dye, non-staining, non-corrosive, non-flammable, non-toxic, specifically formulated to retard the set of fresh concrete surfaces, temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch (to expose surface-seeded aggregates). Material shall meet the maximum Volatile Organic Compound (VOC) content of 350 g/L for concrete curing compounds as required by the U.S. EPA Architectural Coatings Rule and shall be VOC-compliant for the State of California Regulation 8, Organic Compounds, Rule 3, Architectural Coatings.
- 1. Products & Manufacturers: Provide products by one (1) of the following:
 - a. Top-Cast™, Grace Construction Products, Inc.
 - b. Top-Etch Surface Retarder, Unitex Chemicals.
 - c. Exposee, ChemMasters.
 - d. Concrete Surface Retarders, Euclid Chemical Co.
 - e. Rugasol-S, Sika Corporation.
 - f. Atlas Top Etch, Atlas Tech Products.
 - g. Or equal.
- M. Form Ties: Factory-fabricated, as indicated on the Drawings or 1/4" snap ties or for types requiring extra support 3/8" dia she bolts compatible with 1" dia cones. Ties shall be designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
- N. Form Ties for Landscape Walls: 1/4" snap ties, equipped with 1" diameter cone or cones which provide 1" or a 1-1/2" break-back. Whichever break-back size is selected, use throughout this work. Do not use different break-back sizes.
- 1. Form ties for extra support areas: 3/8" diameter she bolts complete with 1" diameter cones.
- O. Stripping Gaskets: Resilient rectangular material non-absorbent and non-staining at junctions of formwork and at junctions for forms with columns and beams as required to permit removal and reuse of formwork without damage.
- P. Form Gaskets: 1/8" x 1/2" adhesive backed foam tape.
- 1. Acceptable Manufacturers:
 - a. Burke Company
 - b. Norton Sealants
 - c. Arlon Co.
- Q. Chairs and spacers: Solid plastic of color matching architectural concrete

- R. Reglets: "Type I Springlock Flashing Reglets" for casting into concrete, constructed from 3/16-inch thick stainless steel for exposed locations.
 - 1. Acceptable Manufacturers:
 - a. Fry Reglet Co.
 - b. Westex Manufacturing Ltd., Vancouver, B.C.

2.2 STEEL REINFORCEMENT AND ACCESSORIES

- A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 80 percent.
- B. Supports for Reinforcement: Lightweight, strong, non-corrosive, durable, and impervious to water. Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement bars, welded wire fabric, and dowels in place, as manufactured from 100% recycled-content plastic or engineered resins from recycled ABS plastic, polycarbonates, and fiberglass.
 - 1. Products & Manufacturers: Provide products by one (1) of the following:
 - a. Rebar Supports, Eclipse Plastics Inc.
 - b. Concrete Casting Plastic Rebar Supports, Build Global, Inc.
 - c. Reinforcing Bar Supports, Shin Hwa Industrial Co.
 - d. Plastic Rebar Supports, Plasticon International, Inc.
 - e. Bar Lift Plastic Support, New Century Northwest.
 - f. Aztec Composite Plastic Rebar Supports, Dayton Superior.
 - g. Or equal.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type II/V, gray or white as needed to achieve desired color effect.
 - a. Fly Ash: ASTM C 618, Class F.
- B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse Aggregate Size: As indicated on the Drawings.
 - 2. Gradation: Uniformly graded.
- C. Normal-Weight Fine Aggregate: ASTM C 33 or ASTM C 144, manufactured or natural sand, from same source for entire Project.

- D. Water: Potable, complying with ASTM C 94/C 94M except free of wash water from mixer washout operations.

2.4 ADMIXTURES

- A. General: Admixtures shall be certified by the Manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other Admixtures. Use of Admixtures shall not relieve the Contractor of the designated concrete requirements, including strength.
- B. Air-Entraining Admixture: ASTM C 260.
 - 1. Products & Manufacturers: Provide products by one (1) of the following:
 - a. Daravair 1000, Grace Construction Products, 800-433-0020.
 - b. Micro-Air, Master Builders, Inc., 800-628-9990.
 - c. Catexol™ A.E. 360, Axim Italcementi Group, 800-899-8795.
 - d. Or equal.
- C. Water-Reducing Admixture: Meet ASTM C494, Type A.
 - 1. Products & Manufacturers: Provide products by one (1) of the following:
 - a. WRDA, Grace Construction Products, 800-433-0020.
 - b. Eucon NW, Euclid Chemical Co., 800-321-7628.
 - c. ChemMasters Corp; Chemtard.
 - d. Cormix Construction Chemicals: Type A Series.
 - e. Euclid Chemical Company; Eucon WR-75.
 - f. Or equal.
- D. Shrinkage-Reducing Admixture: Meet ASTM C157.
 - 1. Products & Manufacturers: Provide products by one (1) of the following:
 - a. Eclipse, Grace Construction Products, 800-433-0020.
 - b. Tetraguard, Master Builders, Inc., 800-628-9990.
 - c. Or equal.

2.5 CURING MATERIALS

- A. Moisture-Retaining Cover: One of the following complying with ASTM C 171:
 - 1. Polyethylene Film (Clear or White Opaque).
 - 2. White-Burlap-Polyethylene Sheet.
 - 3. Reinforced Curing Paper (Regular or White).
- B. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.
 - 1. Products:
 - a. ChemMasters; Spray-Film.
 - b. Conspec Marketing & Manufacturing Co., Inc.; Aquafilm.

- c. Dayton Superior Corporation; Sure Film.
- d. Euclid Chemical Company (The); Eucobar.
- e. Meadows, W. R., Inc.; Sealtight Evapre.
- f. Sika Corporation, Inc.; SikaFilm.

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

- 1. Products:
 - a. ChemMasters; Safe-Cure Clear.
 - b. Conspec Marketing & Manufacturing Co., Inc.; W.B. Resin Cure.
 - c. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W).
 - d. Euclid Chemical Company (The); Kurez DR VOX.
 - e. Kaufman Products, Inc.; Thinfilm 420.
 - f. Lambert Corporation; Aqua Kure-Clear.
 - g. L&M Construction Chemicals, Inc.; L&M Cure R.
 - h. Meadows, W. R., Inc.; 1100 Clear.
 - i. Nox-Crete Products Group, Kinsman Corporation; Resin Cure E.
 - j. Symons Corporation; Resi-Chem Clear.
 - k. Unitex; Hydro Cure 309.

2.6 CONCRETE PAVING SURFACE SEALER

- A. Sealer: Waterbased Clear siloxane or silane penetrating sealer for protection against food stain, water and oil. Acceptable products include, but not limited to:
 - 1. Surebond "SB-5000 – Stain-blocking Invisible Sealer"
 - 2. Prosoco "Stand Off SLX100 Water and Oil Repellent"
 - 3. Glaze n' Seal, "Stone Sealant Impregnator"
 - 4. Glaze n' Seal, "Stain Defense Sealer"
 - 5. GST International "Stainblock Elite"

2.7 REPAIR MATERIALS

- A. Bonding Agent: ASTM C 1059, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- B. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements.
 - 1. Types I and II, non-load bearing and IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.8 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of cast-in-place Architectural concrete proportioned on basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Mix design shall be the responsibility of the Contractor.
 - 2. Contractor shall employ a Testing Laboratory approved by the Architect under the active direction of the Civil Engineer, who shall determine mix designs to fulfill the specified requirements for strength, aggregate size and workability of concrete, and such designs shall be used in proportioning all structural concrete.
 - 3. Mix designs shall be submitted to the Architect for review at least 10 days prior to scheduled concrete pour.
 - 4. Review by the Architect shall not be considered unqualified approval, and shall not relieve the Contractor of his responsibility to furnish concrete of proper consistency and specified strengths.
 - 5. Provide concrete of the strengths indicated in the structural general notes
- B. Portland Cement Concrete used for construction of manholes and other miscellaneous drainage and sewer structures shall meet the mix design requirements of the Sewer and Storm Drainage Facilities section of Table 201-1.1.2 of the SSPWC for the various elements constructed unless noted otherwise.
- C. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.
- D. Proportion concrete mixtures as follows:
 - 1. Compressive Strength (28 Days): As indicated on the Drawings or 4500 psi.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
 - 3. Slump Limit: 4 inches (maximum slump of 8" shall be permitted after introduction of a water-reducing admixture).
- E. Cementitious Materials: For cast-in-place Architectural concrete exposed to deicers, limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements.
- F. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
- G. Admixtures: Use admixtures according to manufacturer's written instructions.

- H. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.9 CONCRETE MIXING

- A. Ready-Mixed Architectural Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.
 - 1. Clean equipment used to mix and deliver cast-in-place Architectural concrete to prevent contamination from other concrete.
 - 2. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

- A. The design, engineering and construction of forms shall be the Contractor's responsibility.
- B. Construct forms to shape, lines and dimensions of architectural concrete members. Spacing of studs, ties and other supporting members shall be such to support maximum pressures imposed by the wet concrete (mix). Final concrete surfaces shall conform to tolerances as specified.
- C. Limit deflection of form-facing panels to not exceed ACI 303.1 requirements.
- D. Fabricate forms to result in cast-in-place Architectural concrete that complies with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- E. Tolerances: In addition to ACI 117, comply with the following tolerances:
 - 1. Tolerances shall not be cumulative.
 - 2. Variation from plumb for lines and surface of columns, walls, beams and arises:
 - a. In any 10' length: 1/8".
 - b. Maximum for entire length: 1/2".
 - 3. Variation from the level or from the indicated elevations of tops of slabs, beams, and arises:
 - a. Across Top: 1/8".

- b. In any 10' length: 3/16".
 - c. In any bay or in any 20' length: 1/4".
 - d. Maximum for entire length: 1/2".
 - 4. Deviation from Round:
 - a. Out of round, 1/4".
- F. Failure to comply with these limits will result in the Contractor, at his expense, filling and/or grinding the sub-standard surfaces, or if this is deemed impossible by the Owner's Representative, then the concrete section shall be removed and reconstructed at no expense to the owner.
- G. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-in-place surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood rustications, keyways, reglets, recesses, and the like, for easy removal.
 - 1. Seal form joints and penetrations at form ties with form joint tape or form joint sealant to prevent cement paste leakage.
 - 2. Do not use rust-stained steel form-facing material.
- H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- I. Coat contact surfaces of wood rustications and chamfer strips with sealer before placing reinforcement, anchoring devices, and embedded items.
- J. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- K. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- L. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- M. Forms shall be tight to prevent concrete loss. Corner chamfer strips are not allowed, making mandatory especially tight well-designed corners of the forms. Continuous girts and blocking shall be provided behind all plywood butt joints not backed.
- N. All forms shall be cleaned of extraneous loose material with compressed air, and thoroughly inspected before use. Forms with clips, dents, damaged corners or

edges, scratches, gouges or other defects that will transfer to the concrete surface will be discarded. Forms shall be thoroughly wetted just before concrete placement. Have sufficient equipment available to allow for these procedures.

- O. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.
- P. Coat contact surfaces of forms with surface retarder, according to manufacturer's written instructions, before placing reinforcement.
- Q. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and attach securely to prevent deflection and maintain stability of liners during concreting. Prevent form liners from sagging and stretching in hot weather. Seal joints of form liners and form liner accessories to prevent mortar leaks. Coat form liner with form-release agent.

3.2 REINFORCEMENT AND INSERTS

- A. General: Securely fasten steel reinforcement and wire ties against shifting during concrete placement.
- B. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.3 REMOVING AND REUSING FORMS

- A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
 - 1. Schedule form removal to maintain surface appearance that matches approved mockups.
- B. Clean and repair surfaces of forms to be reused in the Work. Do not use split, frayed, delaminated, or otherwise damaged form-facing material. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for cast-in-place Architectural concrete surfaces.
- D. Do not reuse forms for board form finish concrete.

3.4 JOINTS

- A. Construction Joints: Install construction joints true to line with faces perpendicular to surface plane of cast-in-place Architectural concrete so strength and

appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated.
 2. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 3. Space vertical joints in walls as indicated on the Drawings or 16'-0" max. on center as approved by the Architect. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
- B. Contraction Joints: Form weakened-plane contraction joints true to line with faces perpendicular to surface plane of cast-in-place Architectural concrete so strength and appearance of concrete are not impaired, at locations indicated on the Drawings or 10'-0" on center as approved by Architect.

3.5 Joint Sealant:

- A. Horizontal Applications: Meet ASTM C920, Type S, Grade P, Class 25, Use T, low-VOC, cold-applied, elastomeric polyurethane Joint Sealant for exterior applications. Color to match adjacent paving color finish.
- B. Products & Manufacturers: Provide products by one (1) of the following:
1. Sika Corporation.
 2. Tremco, Inc.
 3. Sonneborn.
 4. Pecora Corporation.
 5. Or equal.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, form-release agent, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously between construction joints. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 303.1.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. Do not permit vibrators to contact forms.
- E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents.
 4. Do not use chemical accelerators unless otherwise specified and approved in design mixtures.
- F. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.7 CONCRETE FINISHES, GENERAL

- A. Architectural Concrete Finish: Match Architect's design reference sample, identified and described as indicated, to satisfaction of Architect.
- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces.

1. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.
- C. Maintain uniformity of special finishes over construction joints, unless otherwise indicated.

3.8 AS-CAST FORMED FINISHES

- A. Broom Finish: Provide a fine-to-medium texture finish by striating the freshly cast float finished concrete surface with a soft bristle broom, perpendicular to line of traffic, to provide a uniform, consistent, fine-line texture.
1. Light to Medium Broom Finish: 1/16" etch depth or less
 2. Heavy Broom Finish: 1/16"-18" etch depth
- B. Smooth Trowel Finish: Provide a smooth finish by screeding freshly poured concrete. After the bleed water and sheen have disappeared, used a tooled edge for the edges of the concrete. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Immediately smooth the surface with a steel concrete trowel to bring the concrete to a smooth uniform texture.

3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 for hot-weather protection during curing.
- B. Begin curing cast-in-place Architectural concrete immediately after removing forms from or applying as-cast formed finishes to concrete. Cure according to ACI 308.1, by one or a combination of the following methods that will not mottle, discolor, or stain concrete:
1. Moisture Curing: Keep exposed surfaces of cast-in-place Architectural concrete continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days.

Immediately repair any holes or tears during curing period; use cover material and waterproof tape.

3. Curing Compound: Mist concrete surfaces with water. Apply curing compound uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.10 SEALER

- A. Sealer: Apply uniformly in two coats in continuous operations according to manufacturer's written instructions. Allow first coat to dry before applying second coat, at 90-degrees to the direction of the first coat using same application methods and rates.
 1. Begin sealing dry surface no sooner than 14 days after concrete placement or per the manufacturer's recommendations.
 2. Allow stained concrete surfaces to dry before applying sealer.
- B. Mix slip-resistant additive thoroughly in sealer before application according to manufacturer's written instructions. Stir sealer occasionally during application to joint sealant.
- C. Prior to applying the sealant, the joints shall be cleaned of all mortar, laitance, scale, dirt, dust, oil, curing compound, and other foreign materials. The joints and adjacent surfaces shall be dry and where called for by the manufacturer, prepared with a primer. The joints shall be filled from bottom to top without voids. All adjoining surfaces shall be protected during the sealing operations and any stains, marks, or damage resulting from the sealant operations shall be corrected.

3.11 REPAIRS, PROTECTION, AND CLEANING

- A. Repair and cure damaged finished surfaces of cast-in-place Architectural concrete when approved by Architect. Match repairs to color, texture, and uniformity of surrounding surfaces and to repairs on approved mockups.
 1. Remove and replace cast-in-place Architectural concrete that cannot be repaired and cured to Architect's approval.
- B. Protect corners, edges, and surfaces of cast-in-place Architectural concrete from damage; use guards and barricades.
- C. Protect cast-in-place Architectural concrete from staining, laitance, and contamination during remainder of construction period.
- D. Clean cast-in-place Architectural concrete surfaces after finish treatment to remove stains, markings, dust, and debris.

- E. Wash and rinse surfaces according to concrete finish applicator's written recommendations. Protect other Work from staining or damage due to cleaning operations.
 - 1. Do not use cleaning materials or processes that could change the appearance of cast-in-place Architectural concrete finishes.

END OF SECTION 033310

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Metal ladders.
- B. Products furnished, but not installed, under this Section include the following:
 - 1. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

1.2 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Paint products.
 - 2. Grout.
- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
 - 1. Metal ladders.

1.4 INFORMATIONAL SUBMITTALS

- A. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

1.5 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS

- A. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.
- B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
- C. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- D. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide stainless-steel fasteners for fastening aluminum.
 - 2. Provide bronze fasteners for fastening bronze.
- B. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 2.
- C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

- D. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.
- E. Post-Installed Anchors: Torque-controlled expansion anchors.
 - 1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.4 MISCELLANEOUS MATERIALS.

- A. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- C. 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.

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.6 METAL LADDERS

A. General:

1. Comply with ANSI A14.3.

B. Aluminum Ladders:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. O'Keeffe's Inc.
 - b. Precision Ladders, LLC.
 - c. Royalite Manufacturing, Inc.
 - d. Or Equal.
2. Space siderails 24 inches apart unless otherwise indicated.
3. Siderails: Continuous extruded-aluminum channels or tubes, not less than 2-1/2 inches deep, 3/4 inch wide, and 1/8 inch thick.
4. Rungs: Extruded-aluminum tubes, not less than 3/4 inch deep and not less than 1/8 inch thick, with ribbed tread surfaces.
5. Fit rungs in centerline of siderails; fasten by welding or with stainless-steel fasteners or brackets and aluminum rivets.

2.7 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.

- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.8 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 - 1. Cast Aluminum: Heavy coat of bituminous paint.
 - 2. Extruded Aluminum: Two coats of clear lacquer.

END OF SECTION 05 50 00

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Galvanized steel pipe and tube railings.
- B. Related Requirements:

1.2 COORDINATION

- A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Grout, anchoring cement, and paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Evaluation Reports: For post-installed anchors, from ICC-ES.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
 - b. Infill load and other loads need not be assumed to act concurrently.

2.3 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

2.4 STEEL AND IRON

- A. Tubing: ASTM A 513.

B. 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 for exterior installations and where indicated.

C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. 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.

E. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: Where indicated provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.6 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.

- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove flux immediately.
 - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- I. Close exposed ends of railing members with prefabricated end fittings.
- J. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
- K. For railing posts set in concrete, provide galvanized steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

2.7 STEEL AND IRON FINISHES

- A. Galvanized Railings:
 - 1. Hot-dip galvanize steel railings, including hardware, after fabrication.
 - 2. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
 - 3. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.
- B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. 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.
 - 1. Set posts plumb within a tolerance of 1/16 inch in 3 feet.

2. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.2 RAILING CONNECTIONS

- A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.3 ANCHORING 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. Leave anchorage joint exposed with 1/8-inch buildup, sloped away from post.

3.4 ADJUSTING AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780/A 780M.

3.5 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 055213

SECTION 07 52 16 - STYRENE-BUTADIENE-STYRENE (SBS) MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Styrene-butadiene-styrene (SBS)-modified bituminous membrane roofing.
2. Roof insulation.

B. Related Requirements:

1. Section 07 92 00 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

1.2 DEFINITIONS

- A. Roofing Terminology:** Definitions in ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Construction Manager, Project Inspector, Architect, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work, including:
 - 1. Base flashings and membrane terminations.
 - 2. Crickets, saddles, and tapered edge strips, including slopes.
- C. Samples for Verification: For the following products:
 - 1. Cap sheet, of color required.
 - 2. Flashing sheet, of color required.
 - 3. Aggregate surfacing material in gradation and color required.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - 1. Submit evidence of complying with performance requirements.
- C. Product Test Reports: For components of membrane roofing system, for tests performed by manufacturer and witnessed by a qualified testing agency.
- D. Research/Evaluation Reports: For components of membrane roofing system, from ICC-ES.
- E. Sample Warranties: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.
- B. Manufacturer's Representative's final inspection report.
- C. Information Card: Furnish a typewritten card, laminated in plastic. Card shall be 8 1/2 by 11 inches and shall contain the information listed on Form 1 located at end of this section.

1.7 QUALITY ASSURANCE

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

1.8 DELIVERY, STORAGE, AND HANDLING

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

1.9 FIELD CONDITIONS

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

1.10 WARRANTY

- A. **Special Warranty:** Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
 - 1. Special warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, roofing accessories, and other components of roofing system.
 - 2. **Warranty Period:** 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. [GAF Materials Corporation.](#)
 2. [Johns Manville; a Berkshire Hathaway company.](#)
 3. Malarkey Roofing Products.
 4. Or equal.
- B. Source Limitations: Obtain components including roof insulation fasteners Insert products for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.
1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
- C. Roofing System Design: Tested by a qualified testing agency to resist the following uplift pressures calculated according to ASCE/SEI 7:
1. Corner Uplift Pressure: 80 lbf/sq. ft..
 2. Perimeter Uplift Pressure: 53 lbf/sq. ft..
 3. Field-of-Roof Uplift Pressure: 32 lbf/sq. ft..
- D. Energy Performance: Roofing system shall have a minimum aged solar reflectance of 0.63 and a minimum thermal emittance of 0.75 or a minimum solar reflectance index (SRI) of 75 when tested according to CRRC-1.
- E. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

2.3 ROOFING SHEET MATERIALS

- A. Sheathing Paper: Red-rosin type, minimum 3 lb/100 sq. ft.
- B. Base Sheet: ASTM D 4601, Type II, SBS-modified asphalt-impregnated and -coated sheet, with glass-fiber-reinforcing mat, dusted with fine mineral surfacing on both sides.
- C. Roofing Membrane Sheets: ASTM D 6163, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with glass fibers); smooth surfaced; suitable for application method specified.
- D. Granule-Surfaced Roofing Cap Sheet: ASTM D 6163, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with glass fibers); granule surfaced; suitable for application method specified, and as follows:
 - 1. Granule Color: Match existing.

2.4 BASE FLASHING SHEET MATERIALS

- A. Backer Sheet: ASTM D 4601, Type II, asphalt-impregnated and -coated, glass-fiber sheet, dusted with fine mineral surfacing on both sides.
- B. Granule-Surfaced Flashing Sheet: ASTM D 6164/D 6164M, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with polyester fabric) or ASTM D 6162, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers) as standard with roofing manufacturer; granule surfaced; suitable for application method specified, and as follows:
 - 1. Granule Color: Match existing.
- C. Glass-Fiber Fabric: Woven glass-fiber cloth, treated with asphalt, complying with ASTM D 1668, Type I.

2.5 SHEET METAL FLASHING

General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

- 1. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- 2. Color: As selected by Architect from manufacturer's full range.

3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).

2.6 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.
 1. Liquid-type auxiliary materials shall comply with VOC limits of the San Diego Air Pollution Control District.
- B. Roofing Asphalt: ASTM D 312, Type III or IV as recommended by roofing system manufacturer for application, low fuming.
- C. Cold-Applied Adhesive: Roofing system manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with base flashings.
- D. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application.
- E. Mastic Sealant: Polyisobutylene, plain or modified bitumen; nonhardening, nonmigrating, nonskinning, and nondrying.
- F. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing components to substrate; tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.
- G. Roofing Granules: Ceramic-coated roofing granules, No. 11 screen size with 100 percent passing No. 8 sieve and 98 percent of mass retained on No. 40 sieve, color to match roofing.
- H. Miscellaneous Accessories: Provide those recommended by roofing system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:

1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch out of plane relative to adjoining deck.

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

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

3.3 INSTALLATION, GENERAL

A. Comply with roofing system manufacturer's written instructions.

B. Asphalt Heating: Heat asphalt to its equiviscous temperature, measured at the mop cart or mechanical spreader immediately before application. Circulate asphalt during heating. Do not raise asphalt temperature above equiviscous temperature range more than one hour before time of application. Do not exceed asphalt manufacturer's recommended temperature limits during asphalt heating. Do not heat asphalt within 25 deg F of flash point. Discard asphalt maintained at a temperature exceeding finished blowing temperature for more than four hours.

1. Apply hot roofing asphalt within plus or minus 25 deg F of equiviscous temperature.

C. Substrate-Joint Penetrations: Prevent roofing asphalt and adhesives from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

3.4 ROOFING INSTALLATION, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing" and as follows:

1. Deck Type: N (nailable).
2. Adhering Method: M (mopped).
3. Base Sheet: One, installed over sheathing paper.
4. Number of SBS-Modified Asphalt Sheets: Two.
5. Surfacing Type: M (mineral-granule-surfaced cap sheet).

6. Mineral-granule-surfaced cap sheet is in addition to number of ply sheets specified.
- B. Start installation of roofing in presence of manufacturer's technical personnel.
 - C. Where roof slope exceeds 3/4 inch per 12 inches, install roofing membrane sheets parallel with slope.
 1. Backnail roofing sheets to substrate according to roofing system manufacturer's written instructions.
 - D. Coordinate installation of roofing system so insulation and other components of the roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
 1. Provide tie-offs at end of each day's work to cover exposed roofing sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt, with joints and edges sealed.
 2. Complete terminations and base flashings, and provide temporary seals to prevent water from entering completed sections of roofing system.
 3. Remove and discard temporary seals before beginning work on adjoining roofing.

3.5 BASE-SHEET INSTALLATION

- A. Loosely lay one course of sheathing paper, lapping edges and ends a minimum of 2 inches and 6 inches, respectively.
- B. Install lapped base-sheet course, extending sheet over and terminating beyond cants. Attach base sheet as follows:
 1. Mechanically fasten to substrate.

3.6 SBS-MODIFIED BITUMINOUS MEMBRANE INSTALLATION

- A. Install modified bituminous roofing ply sheets and cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate at top of cants, installing as follows:
 1. Adhere to substrate in a solid mopping of hot roofing asphalt applied at not less than 425 deg F.
 2. Unroll roofing sheets and allow them to relax for minimum time period required by manufacturer.
- B. Laps: Accurately align roofing sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.
 1. Repair tears and voids in laps and lapped seams not completely sealed.

2. Apply roofing granules to cover exuded bead at laps while bead is hot.
- C. Install roofing sheets so side and end laps shed water.

3.7 FLASHING AND STRIPPING INSTALLATION

- A. Install base flashing over cant strips and other sloped and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:
1. Prime substrates with asphalt primer if required by roofing system manufacturer.
 2. Backer-Sheet Application: Mechanically fasten backer sheet to walls or parapets. Adhere backer sheet over roofing membrane at cants in a solid mopping of hot roofing asphalt.
 3. Flashing-Sheet Application: Adhere flashing sheet to substrate in a solid mopping of hot roofing asphalt applied at not less than 425 deg F. Apply hot roofing asphalt to back of flashing sheet if recommended by roofing system manufacturer.
- B. Extend base flashing up walls or parapets a minimum of 8 inches above roofing membrane and 4 inches onto field of roofing membrane.
- C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
1. Seal top termination of base flashing with a strip of glass-fiber fabric set in asphalt roofing cement.

3.8 FIELD QUALITY CONTROL

- A. Roofing Inspector: City will engage a qualified roofing inspector to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components.
- B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
1. Notify Construction Manager 48 hours in advance of date and time of inspection.
- C. Test Cuts: District may require test cuts to evaluate problems observed during quality-assurance inspections of built-up roofing. If test cuts are required, engage a qualified testing agency to remove and test specimens as follows:
1. Determine approximate quantities of components within roofing membrane according to ASTM D 3617.

2. Examine test specimens for interply voids according to ASTM D 3617 and to comply with criteria established in Appendix 3 of ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."
 3. Repair areas where test cuts were made according to roofing system manufacturer's written instructions.
- D. Roofing system will be considered defective if it does not pass tests and inspections.
1. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.9 PROTECTING AND CLEANING

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

END OF SECTION 07 52 16

FORM 1 – ROOFING SYSTEM DESCRIPTION

1. Location: _____ 2. Bldg.
Name: _____
3. Bldg. No.: _____ 4. Roof Area (SF) _____ 5. Contract
No.: _____
6. Deck Slope: _____
7. Type of Deck:
- Metal Wood Plank
 - Cast-In-Place Concrete or Plywood
 - Other: _____
 - Precast/Prestressed Concrete
8. Type of Insulation Board:
- Polyisocyanurate/Composite Polyisocyanurate
 - Polystyrene/Composite Polystyrene
 - Perlite Mineral Fiber
 - Other: _____
9. Insulation Manufacturer: _____
10. Insulation Thickness: _____
11. Roofing Type:
- Built-Up (Asphalt) PVC
 - Metal SBS Mod.
 - Bitumen
 - Shingles
 - Other: _____
12. Roofing Manufacturer: _____
13. Roofing Installer/Warrantor: _____
14. Roofing Application Method:
- Bitumen Fully Adhered
 - Mechanically Fastened Mechanically
 - Fastened/Fully Adhered
 - Other _____

15. Warranty Period: From: _____
To: _____

16. Warranty Serial Number: _____

17. Date Roofing Completed: _____ 18.
Inspector: _____

19. Prime Contractor Name/Address: _____

Signature: _____ Date: _____

INSTRUCTIONS FOR FORM 1 (Do Not Post)

1. Location: Name of facility as shown on contract.
2. Bldg./Room Name: As shown on the contract documents.
3. Bldg./Room Number: As required.
4. Roof Area: Area in square feet of roof for which deck insulation, membrane, etc. are the same. A separate form is required if any part of roof system is different over other areas of the roof.
5. Contract Number: As shown on the contract.
6. Show deck slope.
7. Deck: Check appropriate block.
8. Type of Insulation Board: Check appropriate block, as required.
9. Show manufacturer of insulation.
10. Show minimum thickness of installed insulation.
11. Roofing Type: Check appropriate block.
12. Show roofing manufacturer's name.
13. Roofing Installer's or Contractor's name.
14. Roofing Application Method: Check appropriate block.
15. Warranty Period: Insert start and end dates.
16. Warranty Serial Number: Insert serial number.
17. Show date of Substantial Completion. Warranty period begins on this date.
18. Show Project Inspector's name.
19. Prime Contractor Name/Address/Signature: Must be signed and dated by an official of Contracting firm.

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Mildew-resistant joint sealants.
- B. Related Requirements:
 - 1. Section 09 30 13 "Ceramic Tiling".
 - 2. Section 22 40 00 "Plumbing Fixtures".

1.2 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each kind of joint sealant, for tests performed by a qualified testing agency.
- B. Sample Warranties: For special warranties.
 - 1. Testing will not be required if joint-sealant manufacturers submit data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, staining of, and compatibility with joint substrates and other materials matching those submitted.

1.4 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.

3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.5 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Five years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 2. Disintegration of joint substrates from causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content: Sealants and sealant primers shall comply with the following:
 1. Architectural sealants shall have a VOC content of 250 g/L or less.
 2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.
 3. Sealants and sealant primers for porous substrates shall have a VOC content of 775 g/L or less.
 4. Sealant 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."

- C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.
- B. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dow Corning Corporation.
 - b. Pecora Corporation.
 - c. Tremco Incorporated.
 - d. Or equal.

2.3 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dow Corning Corporation.
 - b. Pecora Corporation.
 - c. Tremco Incorporated.
 - d. Or equal.

2.4 BUTYL JOINT SEALANTS

- A. Butyl-Rubber-Based Joint Sealants: ASTM C 1311.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. [Bostik, Inc.](#)
- b. [Pecora Corporation.](#)
- c. Or equal.

2.5 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
 - 1. [Manufacturers:](#) Subject to compliance with requirements, provide products by one of the following:
 - a. [Alcot Plastics Ltd.](#)
 - b. [BASF Corporation; Construction Systems.](#)
 - c. [Construction Foam Products; a division of Nomaco, Inc.](#)
 - d. Or equal.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Unglazed surfaces of ceramic tile.
 - c. Exterior insulation and finish systems.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Joints in exterior insulation and finish systems.
 - c. Joints between different materials listed above.
 - d. Perimeter joints between materials listed above and frames of doors windows and louvers.
 - e. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- B. Joint-Sealant Application: Mildew-resistant exterior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints where indicated.
 - c. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- C. Joint-Sealant Application: Concealed mastics.
 - 1. Joint Locations:
 - a. Aluminum ladder.
 - b. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Butyl-rubber based.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

SECTION 081200 – FIBERGLASS REINFORCED DOOR AND DOOR FRAME SYSTEMS

PART 1 - GENERAL

1.1 THE REQUIREMENT

- A. The CONTRACTOR shall furnish and install all fiberglass-reinforced door and door frame systems and related items, complete and operable, including all finish hardware and all appurtenant Work, all in accordance with the Contract Documents.
- B. The section includes:
 - 1. Fiberglass- Reinforced Plastic (FRP) Doors.
 - 2. Fiberglass Door Frames.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. The requirements of the following sections and divisions apply to the Work of this section. Other sections and divisions of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this Work.
 - 1. Section 087100, Door Hardware

1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. All Work specified herein shall conform to or exceed the applicable requirements of the referenced portions of the following publications to the extent that the provisions thereof are not in conflict with other provisions of these Specifications.
- B. Comply with the applicable editions of the following codes, regulations and standards.
 - 1. Industry Standards:

ASTM D 523	Standard Test Method for Specular Gloss
ASTM D 635	Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
ASTM E 84	Standard Test Method for Surface Burning Characteristics of Building Materials

1.4 SYSTEM DESCRIPTION

- A. Performance Requirements:
 - 1. Door opening assemblies: includes door, frame, panels, and associated door hardware as specified in this section.
 - a. Maximum flame spread 25 in accordance with ASTM E 84, self-extinguishing in accordance with ASTM D 635.

1.5 SUBMITTALS

- A. Submittals shall be made in accordance with the General Requirements, Additional General Requirements and as specified herein.
- B. Product Data: Manufacturer's printed product data sheets including construction and installation details, material descriptions, core descriptions, hardware reinforcements, profiles, anchorage, operational descriptions and finishes.

- C. Shop Drawings:
 - 1. Plans: Indicate location of each door opening assembly in project.
 - 2. Elevations: Dimensioned elevation of each type door opening assembly in project; indicate sizes and locations of door hardware.
 - 3. Details: Installation details of each type installation condition in project.
 - 4. Schedule: Indicate each door opening assembly in project; cross-reference to the Drawings, elevations, and details.
- D. Selection Samples: Manufacturer's standard color chips.
- E. Verification Samples: Two (2) samples to verify color match.
- F. Manufacturer's Instructions: Printed installation instructions for door opening assemblies.
- G. Warranty Documents: Manufacturer's standard warranty documents, executed by manufacturer's representative, countersigned by the CONTRACTOR.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packing, Shipping, Handling and Unloading: Products shall be delivered in original, unbroken, packages or containers bearing the manufacturer's label. Packages or containers shall be delivered to the site with seals unbroken.
- B. Storage: Products shall be carefully stored in a manner that will prevent damage and in an area that is protected from the deleterious effects of the elements.

1.7 WARRANTY

- A. Manufacturer's Warranty:
 - 1. Manufacturer's 10-year warranty against failure due to corrosion from specified environment.
 - 2. The hardware manufacturer's warranty shall be included with the hardware installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: FIB-R-DOR Division of Advance Fiberglass, Inc.; Chem-Pruf Door Company; Corrim Company; or equal.

2.2 MATERIALS

- A. Fiberglass Mat: Minimum 1.5 ounces per square foot.
- B. Resins: Door and frame assemblies to be used in an environment where exposure to sulfuric acid, chlorine, and other chemical agents are possible, therefore resins that are resistant to damage from such corrosive environments shall be selected.
- C. Fasteners: Stainless steel.

2.3 MANUFACTURED UNITS

- A. Nonrated Fiberglass-Reinforced Plastic (FRP) Doors:

1. Thickness: 1-3/4 inches.
 2. Construction:
 - a. Core: All voids between the door plates shall be completely filled with the equivalent of 4 to 6 pounds of expanded polyurethane foam, having a flame spread of 25 or less per ASTM E 84. A phenolic-coated kraft honeycomb may be substituted for urethane when accepted by the Architect.
 - b. Door Plates: Molded in one continuous piece, resin reinforced with hand-laid glass fiber mat, nominal 1/8-inch-thick, minimum 15-mil, gel-coated surface.
 - c. Door Edges: Minimum three (3) layers resin-reinforced glass fiber mat, nominal 3/8-inch-thick, machine tooled.
 3. Sizes: As indicated on the Drawings.
 4. Finish: Minimum 15-mil gel-coated smooth gloss surface with a minimum value of 88 in accordance with ASTM D 523.
 5. Color: As indicated, or if not indicated, as selected by the Architect from manufacturer's full range of available colors.
- B. Nonrated Fiberglass Frames:
1. Construction: One-piece pultruded fiberglass-reinforced plastic, minimum 1/4-inch wall thickness, jamb-to-head joints mitered and reinforced with FRP clips and stainless steel fasteners; conforming to SDI requirements for performance equivalent to 16-gage steel frames.
 2. Frame profile: 5-3/4 inches deep, 2-inch-wide face; double rabbeted with 5/8-inch-high stop.
 3. Sizes: As indicated on the Drawings.
 4. Finish: Minimum 15-mil gel-coated smooth gloss surface with a minimum value of 88 in accordance with ASTM D 523.
 5. Color: As indicated, or if not indicated, as selected by the Architect from manufacturer's full range of available colors.
- C. Frame Anchors: Types recommended by manufacturer for retrofit project conditions.
- D. Door Hardware: Specified in Section 087100, Door Hardware.

2.4 FABRICATION

- A. Fiberglass-Reinforced Plastic (FRP) Doors:
1. Fabricate fiberglass reinforced door and frame units to be rigid, neat in appearance and free from defects, warp or buckle.
 2. Minimum glass fiber-to-resin ratio: 30 percent.
 3. Mortise for lockset, and recess for strike plate in lock stile.
 4. Embed steel reinforcement for hinges, door closers, locksets and other specified hardware in fiberglass matrix; provide for hinge leaf recesses in hinge stile.
- B. Fiberglass Frames:
1. Mortise for lock strike, and recess for strike plate in lock jamb.

2. Reinforce for hinges and other indicated hardware.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Openings are correctly prepared to receive doors and frames.
2. Openings are correct size and depth in accordance with shop drawings.

B. Installer's Examination:

1. Have installer examine conditions under which construction activities of this section are to be performed and submit written report if conditions are unacceptable.
2. Transmit two copies of installer's report to the Architect within 24 hours of receipt.
3. Beginning construction activities of this section before unacceptable conditions have been corrected is prohibited.
4. Beginning construction activities of this section indicates installer's acceptance of conditions.

C. Verify that glazing has been factory-installed.

3.2 INSTALLATION

A. Install door opening assemblies in accordance with shop drawings, SDI 250.8, and manufacturer's printed installation instructions, using installation methods and materials specified in installation instructions.

B. Installation of door hardware

1. Specified in Section 087100, Door Hardware.

C. Install door hardware in accordance with manufacturer's printed instructions.

D. Site Tolerances: Maintain plumb and level tolerances specified in manufacturer's printed installation instructions.

3.3 ADJUSTING

A. Adjust doors in accordance with door manufacturer's maintenance instructions to swing open and shut without binding, and to remain in place at any angle without being moved by gravitational influence.

B. Adjust door hardware to operate correctly in accordance with hardware manufacturer's maintenance instructions.

3.4 CLEANING

A. Clean surfaces of door opening assemblies and sight-exposed door hardware in accordance with manufacturer's maintenance instructions.

3.5 PROTECTION OF INSTALLED PRODUCTS

A. Protect door opening assemblies and door hardware from damage by subsequent construction activities until final inspection.

END OF SECTION 081200

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes access doors and frames for walls.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, fire ratings, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples: For each type of access door and frame and for each finish specified, complete assembly minimum 6 by 6 inches in size.
- C. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND FRAMES

- A. Flush Access Doors with Exposed Flanges:
 - 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. [Elmdor/Stoneman Manufacturing Company; a division of Acorn Engineering Company.](#)
 - b. [Milcor: Commercial Products Group of Hart & Cooley, Inc.](#)
 - c. [Nystrom, Inc.](#)
 - d. Or equal.
 - 2. Description: Face of door flush with frame, with exposed flange and concealed hinge.
 - 3. Locations: Wall.
 - 4. Door Size: 12"x12" in walls, unless otherwise indicated..
 - 5. Stainless-Steel Sheet for Door: Nominal 0.062 inch, 16 gage, No. 4 finish.
 - 6. Frame Material: Same material, thickness, and finish as door.
 - 7. Latch and Lock: Cam latch, key operated.

2.2 MATERIALS

- A. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304. Remove tool and die marks and stretch lines, or blend into finish.
- B. Frame Anchors: Same material as door face.
- C. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.3 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.
- D. Latch and Lock Hardware:
 - 1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
 - 2. Keys: Furnish two keys per lock and key all locks alike.

2.4 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Stainless-Steel Finishes:
 - 1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 - 2. Polished Finish: No. 4 finish. Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.

- b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- 3. Bright, Cold-Rolled, Unpolished Finish: No. 2B.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083113

SECTION 083483 - FLOOR DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes floor doors.
- B. Related Requirements:
 - 1. Section 083113 "Access Doors and Frames" for wall- and ceiling-mounted access doors and frames.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details materials, individual components and profiles, and finishes.
- B. Product Schedule: For floor doors.

PART 2 - PRODUCTS

2.1 ALUMINUM FLOOR DOORS

- A. Angle Frame Aluminum Floor Door:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Acudor Products, Inc.
 - b. Bilco Company (The).
 - c. Nystrom, Inc.
 - 2. Frame: Mill finish aluminum, angle profile.
 - 3. Door: Single leaf; 1/4-inch-thick, diamond-pattern mill-finish aluminum plate.
 - 4. Loading Capacity: 150-lbf/sq. ft. pedestrian live load.
 - 5. Hardware:
 - a. Material and Finish: Type 316 stainless steel, including latch and lifting mechanism assemblies, hold-open arms, and brackets, hinges, pins, and fasteners.
 - b. Hinges: Heavy-duty butt hinges with stainless-steel pins.

- c. Operating Mechanism: Adjustable counterbalancing springs, heavy-duty hold-open arm that automatically locks door open at 90 degrees, release handle with vinyl grip that allows for one-handed closure, and recessed lift handle.
 - d. Latch: Stainless-steel slam latch.
 - e. Lock: Recessed padlock hasp with cover.
- B. Safety Accessories: Safety telescoping safety post.

2.2 MATERIALS

- A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
- B. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- C. Aluminum Sheet: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- D. Frame Anchors: Same material as door face.
- E. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.3 FABRICATION

- A. General: Provide floor doors manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure floor doors to types of supports indicated.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
 - 1. For cylinder locks, furnish two keys per lock and key all locks alike.
 - 2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.
- E. Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that comes in contact with concrete.

2.4 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
- E. Prime Painted Steel: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
- F. Stainless-Steel Finish: Bright, cold-rolled, unpolished No. 2B finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor doors.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083483

SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY:

- A. Section Includes: Finish Hardware for door openings, except as otherwise specified herein.
 - 1. Door hardware for fiberglass reinforced plastic (FRP) doors.
 - 2. Door hardware for other gates indicated.
 - 3. Keyed cylinders as indicated.

- B. Related Sections:
 - 1. Division 087100: Fiberglass Reinforced Door and Door Frame Systems

- C. References: Comply with applicable requirements of the following standards. Where these standards conflict with other specific requirements, the most restrictive shall govern.
 - 1. Builders Hardware Manufacturing Association (BHMA)
 - 2. NFPA 101 Life Safety Code
 - 3. NFPA 80 -Fire Doors and Windows
 - 4. ANSI-A156.xx- Various Performance Standards for Finish Hardware
 - 5. UL10C – Positive Pressure Fire Test of Door Assemblies
 - 6. ANSI-A117.1 – Accessible and Usable Buildings and Facilities
 - 7. DHI /ANSI A115.IG – Installation Guide for Doors and Hardware
 - 8. ICC – International Building Code

- D. Intent of Hardware Groups
 - 1. Should items of hardware not definitely specified be required for completion of the Work, furnish such items of type and quality comparable to adjacent hardware and appropriate for service required.
 - 2. Where items of hardware aren't definitely or correctly specified, are required for completion of the Work, a written statement of such omission, error, or other discrepancy to be submitted to Architect, prior to date specified for receipt of bids for clarification by addendum; or, furnish such items in the type and quality established by this specification, and appropriate to the service intended.

1.2 SUBSTITUTIONS:

- A. Comply with Division 1.

1.3 SUBMITTALS:

- A. Product Data: Manufacturer's specifications and technical data including the following:
 - 1. Detailed specification of construction and fabrication.

2. Manufacturer's installation instructions.
3. Submit catalog cuts with hardware schedule.
4. Provide 9001-Quality Management and 14001-Environmental Management for products listed in Materials Section 2.2

B. Shop Drawings - Hardware Schedule:

1. List groups and suffixes in proper sequence.
2. Completely describe door and list architectural door number.
3. Manufacturer, product name, and catalog number.
4. Function, type, and style.
5. Size and finish of each item.
6. Mounting heights.
7. Explanation of abbreviations and symbols used within schedule.

C. Templates: Submit templates and "reviewed Hardware Schedule" to door and frame supplier and others as applicable to enable proper and accurate sizing and locations of cutouts and reinforcing.

D. Contract Closeout Submittals:

1. Operating and maintenance manuals:
 - a. Complete information in care, maintenance, and adjustment, and 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.
2. Copy of final hardware schedule, edited to reflect, "As installed".
3. Copy of final keying schedule
4. One set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

1.4 QUALITY ASSURANCE

A.

1. Statement of qualification for distributor and installers.
2. Statement of compliance with regulatory requirements and single source responsibility.
3. Distributor's Qualifications: Firm with experience in the distribution of commercial hardware.
 - a. Distributor to employ full time Architectural Hardware Consultants (AHC) for the purpose of scheduling and coordinating hardware and establishing keying schedule.
 - b. Hardware Schedule shall be prepared and signed by an AHC.

4. Installer's Qualifications: Firm with experience in installation of similar hardware to that required for this Project, including specific requirements indicated.

5. Single Source Responsibility: Except where specified in hardware schedule, furnish products of only one manufacturer for each type of hardware.

B. Review Project for extent of finish hardware required to complete the Work. Where there is a conflict between these Specifications and the existing hardware, notify the Architect in writing and furnish hardware in compliance with the Specification unless otherwise directed in writing by the Architect.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping:

1. Deliver products in original unopened packaging with legible manufacturer's identification.
2. Package hardware to prevent damage during transit and storage.
3. Mark hardware to correspond with "reviewed hardware schedule".
4. Deliver hardware to door and frame manufacturer upon request.

B. Storage and Protection: Comply with manufacturer's recommendations.

1.6 PROJECT CONDITIONS:

A. Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for the proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents.

B. Review Shop Drawings for doors and entrances to confirm that adequate provisions will be made for the proper installation of hardware.

1.7 WARRANTY:

A. Refer to Conditions of the Contract

B. Manufacturer's Warranty:

1. Closers: Thirty years
2. Exit Devices: Five Years
3. Locksets & Cylinders: Ten years
4. All other Hardware: Two years.

1.8 OWNER'S INSTRUCTION:

A. Instruct Owner's personnel in operation and maintenance of hardware units.

1.9 MAINTENANCE:

- A. Extra Service Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels.
 - 1. Special Tools: Provide special wrenches and tools applicable to each different or special hardware component.
 - 2. Maintenance Tools: Provide maintenance tools and accessories supplied by hardware component manufacturer.
 - 3. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra service materials.
- B. Maintenance Service: Submit for Owner's consideration maintenance service agreement for electronic products installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. The following manufacturers are approved subject to compliance with requirements of the Contract Documents. Approval of manufacturers other than those listed shall be in accordance with Division 1.

<u>Item:</u>	<u>Manufacturer:</u>
Hinges	Stanley
Continuous Hinges	Stanley
Locksets	Best
Cylinders	Best
Exit Devices	Precision
Closers	LCN
Push/Pull Plates	Trimco
Push/Pull Bars	Trimco
Protection Plates	Trimco
Overhead Stops	ABH
Door Stops	Trimco
Flush Bolts	Trimco
Coordinator & Brackets	Trimco
Threshold & Gasketing	National Guard

2.2 MATERIALS:

- A. Hinges: Shall be Five Knuckle Ball bearing hinges
 - 1. Template screw hole locations
 - 2. Bearings are to be fully hardened.
 - 3. Bearing shell is to be consistent shape with barrel.

4. Minimum of 2 permanently lubricated non-detachable bearings on standard weight hinge and 4 permanently lubricated bearing on heavy weight hinges.
5. Equip with easily seated, non-rising pins.
6. Non Removable Pin screws shall be slotted stainless steel screws.
7. Hinges shall be full polished, front, back and barrel.
8. Hinge pin is to be fully plated.
9. Bearing assembly is to be installed after plating.
10. Sufficient size to allow 180-degree swing of door
11. Furnish five knuckles with flush ball bearings
12. Provide hinge type as listed in schedule.
13. Furnish 3 hinges per leaf to 7 foot 6 inch height. Add one for each additional 30 inches in height or fraction thereof.
14. Tested and approved by BHMA for all applicable ANSI Standards for type, size, function and finish
15. UL10C listed for Fire rated doors.

B. Geared Continuous Hinges:

1. Tested and approved by BHMA for ANSI A156.26-1996 Grade 1
2. Anti-spinning through fastener
3. UL10C listed for 3 hour Fire rating
4. Non-handed
5. Lifetime warranty
6. Provide Fire Pins for 3-hour fire ratings
7. Sufficient size to permit door to swing 180 degrees

C. Cylindrical Type Locks and Latchsets:

1. Tested and approved by BHMA for ANSI A156.2, Series 4000, Operational Grade 1, Extra-Heavy Duty, and be UL10C listed.
2. Provide 9001-Quality Management and 14001-Environmental Management.
3. Fit modified ANSI A115.2 door preparation.
4. Locksets and cores to be of the same manufacturer to maintain complete lockset warranty
5. Locksets to have anti-rotational studs that are thru-bolted
6. Keyed lever shall not have exposed "keeper" hole
7. Each lever to have independent spring mechanism controlling it
8. 2-3/4 inch (70 mm) backset
9. 9/16 inch (14 mm) throw latchbolt
10. Provide sufficient curved strike lip to protect door trim
11. Outside lever sleeve to be seamless, of one-piece construction made of a hardened steel alloy
12. Keyed lever to be removable only after core is removed, by authorized control key
13. Provide locksets with 7-pin removable and interchangeable core cylinders
14. Hub, side plate, shrouded rose, locking pin to be a one-piece casting with a shrouded locking lug.
15. Locksets outside locked lever must withstand minimum 1400 inch pounds of torque. In excess of that, a replaceable part will shear. Key from outside and inside lever will still operate lockset.

16. Core face must be the same finish as the lockset.
17. Functions and design as indicated in the hardware groups.

D. Exit Devices with Weatherized True Architectural Finish 626W:

1. Exit devices to meet or exceed BHMA for ANSI 156.3, Grade 1.
2. Exit devices to be tested and certified by UL or by a recognized independent laboratory to meet or exceed the following :
 - A. Mechanical operational testing to 10 million cycles minimum with inspection confirming Grade 1 Loaded Forces have been maintained.
 - B. BHMA 156.3 – A156.18 Salt Spray Certified 600 Hours 3 X Standard.
 - C. MIL-STD-810G 509.6 Salt Fog Certified.
 - D. MIL-STD-810G 510.6 Sand & Dust Certified.
 - E. MIL-STD-810G 521.4 Icing/Freezing Rain Certified.
3. Exit devices chassis to be investment cast steel, zinc dichromate.
4. Exit devices to have stainless steel deadlocking $\frac{3}{4}$ " through latch bolt.
5. Exit devices to be equipped with sound dampening on touchbar.
6. Non-fire rated exit devices to have cylinder dogging.
7. Non-fire rated exit devices to have $\frac{1}{4}$ " minimum turn hex key dogging.
8. All Exterior components of the exit device including the Active case cover, Touch bar, device channel, slide channel fillers, Vertical rods, latch covers and device end cap, shall be constructed of a brass base metal then plated in a double dip two step process of satin nickel and chrome.
9. Exit device shall be available with options of WTS Weatherized touch bar switch and WALW Weatherized Exit alarm (hardwired)
10. Additional non-weatherized electrified options are compatible with the 626W. Non-weatherized options are not recommended for harsh environments.
11. Touchpad to be "T" style constructed.
12. Touchbar assembly on wide style exit devices to have a $\frac{1}{4}$ " clearance to allow for vision frames.
13. All exposed exit device components to be of architectural metals and "true" architectural finishes.
14. Provide strikes as required by application.
15. Fire exit hardware to conform to UL10C and UBC 7-2. UL tested for Accident Hazard.
16. The strike is to be black powder coated finish.
17. Exit devices to have field reversible handing.
18. Provide heavy duty vandal resistant lever trim with heavy duty investment cast stainless steel components and extra strength shock absorbing overload springs. Lever shall not require resetting. Lever design to match locksets and latchsets.
19. Provide 9001-Quality Management and 14001-Environmental Management.
20. Vertical Latch Assemblies to have gravity operation, no springs.
21. Approved Manufacturers
 - a. The following manufacturers will be approved contingent on meeting or exceeding the above performance criteria:
 - 1) Precision with 626W finish, Manufactured by Stanley Security Solutions

E. Cylinders:

1. Provide the necessary cylinder housings, collars, rings & springs as recommended by the manufacturer for proper installation.
2. Provide the proper cylinder cams or tail piece as required to operate all locksets and other keyed hardware items listed in the hardware sets.
3. Coordinate and provide as required for related sections.

F. Door Closers shall:

1. Tested and approved by BHMA for ANSI 156.4, Grade 1
2. UL10C certified
3. Provide 9001-Quality Management and 14001-Environmental Management.
4. Closer shall have extra-duty arms and knuckles
5. Conform to ANSI 117.1
6. Maximum 2 7/16 inch case projection with non-ferrous cover
7. Separate adjusting valves for closing and latching speed, and backcheck
8. Provide adapter plates, shim spacers and blade stop spacers as required by frame and door conditions
9. Full rack and pinion type closer with 1½" minimum bore
10. Mount closers on non-public side of door, unless otherwise noted in specification
11. Closers shall be non-handed, non-sized and multi-sized.

G. Door Stops: Provide a dome floor or wall stop for every opening as listed in the hardware sets.

1. Wall stop and floor stop shall be wrought bronze, brass or stainless steel.
2. Provide fastener suitable for wall construction.
3. Coordinate reinforcement of walls where wall stop is specified.
4. Provide dome stops where wall stops are not practical. Provide spacers or carpet riser for floor conditions encountered

H. Over Head Stops: Provide a Surface mounted or concealed overhead when a floor or wall stop cannot be used or when listed in the hardware set.

1. Concealed overhead stops shall be heavy duty bronze or stainless steel.
2. Surface overhead stops shall be heavy duty bronze or stainless steel.

I. Kickplates: Provide with four beveled edges ANSI J102, 10 inches high by width less 2 inches on single doors and 1 inch on pairs of doors. Furnish oval-head countersunk screws to match finish.

J. Mop plates: Provide with four beveled edges ANSI J103, 4 inches high by width less 1 inch on single doors and 1 inch on pairs of doors. Furnish oval-head countersunk screws to match finish.

K. Door Bolts: Flush bolts for wood or metal doors.

1. Provide a set of Automatic bolts, Certified ANSI/BHMA 156.3 Type 25 for hollow metal label doors.
2. Provide a set of Automatic bolts, Certified ANSI/BHMA 156.3 Type 27 at wood label doors.

3. Manual flush bolts, Certified ANSI/BHMA 156.16 at openings where allowed local authority.
 4. Provide Dust Proof Strike, Certified ANSI/BHMA 156.16 at doors with flush bolts without thresholds.
- L. Coordinator and Brackets: Provide a surface mounted coordinator when automatic bolts are used in the hardware set.
1. Coordinator, Certified ANSI/BHMA A1156.3 Type 21A for full width of the opening.
 2. Provide mounting brackets for soffit applied hardware.
 3. Provide hardware preparation (cutouts) for latches as necessary.
- M. Weatherstripping: Provide at head and jambs only those units where resilient or flexible seal strip is easily replaceable. Where bar-type weatherstrip is used with parallel arm mounted closers install weatherstrip first.
1. Weatherstrip shall be resilient seal of (Neoprene, Polyurethane, Vinyl, Pile, Nylon Brush, Silicone)
 2. UL10C Positive Pressure rated seal set when required.
- N. Door Bottoms/Sweeps: Surface mounted or concealed door bottom where listed in the hardware sets.
1. Door seal shall be resilient seal of (Neoprene, Polyurethane, Nylon Brush, Silicone)
 2. UL10C Positive Pressure rated seal set when required.
- O. Thresholds: Thresholds shall be aluminum beveled type with maximum height of ½” for conformance with ADA requirements. Furnish as specified and per details. Provide fasteners and screws suitable for floor conditions.

2.3 FINISH:

- A. Designations used in Schedule of Finish Hardware - 3.05, and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18 including coordination with traditional U.S. finishes shown by certain manufacturers for their products
- B. Powder coat door closers to match other hardware, unless otherwise noted.
- C. Aluminum items shall be finished to match predominant adjacent material. Seals to coordinate with frame color.

2.4 KEYS AND KEYING:

- A. Provide keyed brass construction cores and keys during the construction period. Construction control and operating keys and core shall not be part of the Owner's permanent keying system or furnished in the same keyway (or key section) as the Owner's permanent keying system. Permanent cores and keys (prepared according to the accepted keying schedule) will be furnished to the Owner.

- B. Cylinders, removable and interchangeable core system: Best CORMAX™ Patented 7-pin.
- C. Permanent keys and cores: Stamped with the applicable key mark for identification. These visual key control marks or codes will not include the actual key cuts. Permanent keys will also be stamped "Do Not Duplicate."
- D. Transmit Grand Masterkeys, Masterkeys and other Security keys to Owner by Registered Mail, return receipt requested.
- E. Furnish keys in the following quantities:
 - 1. 1 each Grand Masterkeys
 - 2. 4 each Masterkeys
 - 3. 2 each Change keys each keyed core
 - 4. 15 each Construction masterkeys
 - 5. 1 each Control keys
- F. The Owner, or the Owner's agent, will install permanent cores and return the construction cores to the Hardware Supplier. Construction cores and keys remain the property of the Hardware Supplier.
- G. Keying Schedule: Arrange for a keying meeting, and programming meeting with Architect Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying and programming complies with project requirements. Furnish 3 typed copies of keying and programming schedule to Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of conditions: Examine doors, frames, related items and conditions under which Work is to be performed and identify conditions detrimental to proper and or timely completion.
 - 1. Do not proceed until unsatisfactory conditions have been corrected.

3.2 HARDWARE LOCATIONS:

- A. Mount hardware units at heights indicated in the following publications except as specifically indicated or required to comply with the governing regulations.
 - 1. Recommended Locations for Builder's Hardware for Standard Steel Doors and Frames, by the Door and Hardware Institute (DHI).
 - 2. Recommended locations for Architectural Hardware for flush wood doors (DHI).
 - 3. WDMA Industry Standard I.S.-1A-04, Industry Standard for Architectural wood flush doors.

3.3 INSTALLATION:

- A. Install each hardware item per manufacturer's instructions and recommendations. Do not install surface mounted items until finishes have been completed on the substrate. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- B. Conform to local governing agency security ordinance.
- C. Install Conforming to ICC/ANSI A117.1 Accessible and Usable Building and Facilities.
 - 1. Adjust door closer sweep periods so that from the open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the landing side of the door.
- D. Installed hardware using the manufacturers fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use "Riv-Nuts" or similar products.

3.4 FIELD QUALITY CONTROL AND FINAL ADJUSTMENT

- A. Contractor/Installers, Field Services: After installation is complete, contractor shall inspect the completed door openings on site to verify installation of hardware is complete and properly adjusted, in accordance with both the Contract Documents and final shop drawings.
 - 1. Check and adjust closers to ensure proper operation.
 - 2. Check latchset, lockset, and exit devices are properly installed and adjusted to ensure proper operation.
 - a. Verify levers are free from binding.
 - b. Ensure latchbolts and dead bolts are engaged into strike and hardware is functioning.
 - 3. Report findings, in writing, to architect indicating that all hardware is installed and functioning properly. Include recommendations outlining corrective actions for improperly functioning hardware if required.

3.5 SCHEDULE OF FINISH HARDWARE:

Manufacturer List

<u>Code</u>	<u>Name</u>
AB	ABH Manufacturing Inc.
BE	Best Access Systems
LC	LCN Closers
NA	National Guard
PR	Precision

ST	Stanley
TR	Trimco

Finish List

<u>Code</u>	<u>Description</u>
AL	Aluminum
AL	Aluminum (BHMA 689)
626	Satin Chromium Plated
630	Satin Stainless Steel
626W	Weatherized Satin Chrome
US32D	Stainless Steel, Dull

Option List

<u>Code</u>	<u>Description</u>
CD	Cylinder Dogging
B4E	Beveled 4 Edges
CSK	Counter Sunk Screw Holes

Hardware Sets

SET #1

Doors: 100, 101

2	Continuous Hinge	661HD UL	AL	ST
1	Flush Bolt	3917-12 (Top Bolt Only)	626	TR
1	Lockset	9K3-7D15D PATD	626	BE
1	Closer	4040 XP HCUSH	AL	LC
2	Overhead Holder	4411	US32D	AB
2	Kick Plate	K0050 10" x 2" LDW B4E CSK	630	TR
1	Gasketing	5050B Head & Jambs	NA	

NOTE: Install closer on active door leaf and overhead holder on inactive door leaf.

SET #2

Doors: G101, G102, G103

1 Exit Device	2101 CD	626W	PR
1 Mortise Cylinder	1E-74 PATD	626	BE

NOTE: Balance of hardware by Gate Mfg.

SECTION 092400 - CEMENT PLASTERING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior vertical plasterwork (stucco).
2. Exterior horizontal and nonvertical plasterwork (stucco).

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show locations and installation of control and expansion joints, including plans, elevations, sections, details of components, and attachments to other work.

C. Samples: For each type of factory-prepared finish coat and for each color and texture specified.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover, and keep them dry and protected against damage from weather, moisture, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.4 FIELD CONDITIONS

A. Comply with ASTM C 926 requirements.

B. Exterior Plasterwork:

1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
2. Apply plaster when ambient temperature is greater than 40 deg F.
3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.

C. Factory-Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

PART 2 - PRODUCTS

2.1 METAL LATH

- A. Expanded-Metal Lath: ASTM C 847, cold-rolled carbon-steel sheet with ASTM A 653/A 653M, G60, hot-dip galvanized-zinc coating.
 - 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. CEMCO; California Expanded Metal Products Co.
 - b. ClarkDietrich Building Systems.
 - c. Phillips Manufacturing Co.
 - d. Or equal.
 - 2. Diamond-Mesh Lath: Self-furring, 3.4 lb/sq. yd..

2.2 ACCESSORIES

- A. General: Comply with ASTM C 1063, and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.
- B. Metal Accessories:
 - 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. CEMCO; California Expanded Metal Products Co.
 - b. ClarkDietrich Building Systems.
 - c. Phillips Manufacturing Co.
 - d. Or equal.
 - 2. Foundation Weep Scream: Fabricated from hot-dip galvanized-steel sheet, ASTM A 653/A 653M, G60 zinc coating.

2.3 MISCELLANEOUS MATERIALS

- A. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
- B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch long, free of contaminants, manufactured for use in cement plaster.
- C. Fasteners for Attaching Metal Lath to Substrates: ASTM C 1063.
- D. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch diameter unless otherwise indicated.

- E. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

2.4 PLASTER MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I.
 - 1. Color for Finish Coats: White.
- B. Colorants for Job-Mixed Finish Coats: Colorfast mineral pigments that produce finish plaster color selected from manufacturers full range of color.
- C. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.
- D. Sand Aggregate: ASTM C 897.
 - 1. Color for Job-Mixed Finish Coats: As selected from manufacturers full range of colors.

2.5 PLASTER MIXES

- A. General: Comply with ASTM C 926 for applications indicated.
 - 1. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. yd. of cementitious materials.
- B. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:
 - 1. Portland Cement Mixes:
 - a. Scratch Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
 - b. Brown Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 parts lime. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.
- C. Job-Mixed Finish-Coat Mixes:
 - 1. Portland Cement Mix: For cementitious materials, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 1-1/2 to 3 parts aggregate per part of cementitious material.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.
- B. Prepare smooth, solid substrates for plaster according to ASTM C 926.

3.3 INSTALLATION, GENERAL

- A. Sound-Attenuation Blankets: Where required, install blankets before installing lath unless blankets are readily installed after lath has been installed on one side.

3.4 INSTALLING METAL LATH

- A. Metal Lath: Install according to ASTM C 1063.
 - 1. Partition Framing and Vertical Furring: Install self-furring-diamond-mesh lath.
 - 2. Flat-Ceiling and Horizontal Framing: Install flat-diamond-mesh lath.
 - 3. On Solid Surfaces, Not Otherwise Furred: Install self-furring, diamond-mesh lath.

3.5 INSTALLING ACCESSORIES

- A. Install according to ASTM C 1063 and at locations indicated on Drawings.
- B. Reinforcement for External (Outside) Corners:
 - 1. Install lath-type, external-corner reinforcement at exterior locations.
- C. Control Joints: Locate as approved by Architect for visual effect and as follows:
 - 1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:
 - a. Vertical Surfaces: 144 sq. ft..
 - b. Horizontal and Other Nonvertical Surfaces: 100 sq. ft..

2. At distances between control joints of not greater than 18 feet o.c.
3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
4. Where control joints occur in surface of construction directly behind plaster.
5. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

3.6 PLASTER APPLICATION

- A. General: Comply with ASTM C 926.
 1. Do not deviate more than plus or minus 1/4 inch in 10 feet from a true plane in finished plaster surfaces when measured by a 10-foot straightedge placed on surface.
 2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
- B. Walls; Base-Coat Mixes for Use over Metal Lath: For scratch and brown coats, for three-coat plasterwork with 3/4-inch total thickness, as follows:
 1. Portland cement mixes.
- C. Walls; Base-Coat Mix: For base (scratch) coat, for two-coat plasterwork and having 3/8-inch thickness on masonry, as follows:
 1. Portland cement mix.
- D. Plaster Finish Coats: Apply to provide float finish to match Architect's sample.
- E. Concealed Exterior Plasterwork: Where plaster application is used as a base for adhered finishes, omit finish coat.

3.7 PLASTER REPAIRS

- A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.8 CLEANING AND PROTECTION

- A. Remove temporary protection and enclosure of other work after plastering is complete. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION 092400

SECTION 093013 - CERAMIC TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glazed wall tile.

B. Related Requirements:

1. Section 079200 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

1.2 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."

- C. Module Size: Actual tile size plus joint width indicated.

- D. Face Size: Actual tile size, excluding spacer lugs.

1.3 ACTION SUBMITTALS

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

- B. Samples for Initial Selection: For tile, grout, and accessories involving color selection.

- C. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Product Certificates: For each type of product.
- C. Product Test Reports: For tile-setting and -grouting products.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Installer employs Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.
 - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
 - 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.

2. Obtain crack isolation membrane, except for sheet products, from manufacturer of setting and grouting materials.

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 1. Provide tile complying with Standard grade requirements.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

2.3 TILE PRODUCTS

- A. Ceramic Tile Type CT-1: Glazed wall tile.
 1. Basis-of-Design Product: Subject to compliance with requirements provide InterCeramic Wall Tile Collection or a comparable product by one of the following or approved equal:
 - a. Daltile
 2. Module Size: 6 by 6 inches.
 3. Thickness: 5/16 inch.
 4. Face: Plain with modified square edges or cushion edges.
 5. Finish: Bright, opaque glaze.
 6. Tile Color and Pattern: IC Brites - Buttercream.
 7. Grout Color: As selected by Architect from manufacturer's full range, to match existing.
 8. Mounting: Factory, back mounted.
- B. Ceramic Tile Type CT-2: Glazed wall tile.
 1. Basis-of-Design Product: Subject to compliance with requirements provide InterCeramic Wall Tile Collection or a comparable product by one of the following or approved equal:
 - a. Daltile
 2. Module Size: 6 by 6 inches.
 3. Thickness: 5/16 inch.
 4. Face: Plain with modified square edges or cushion edges.
 5. Finish: Bright, opaque glaze.
 6. Tile Color and Pattern: Bold Tones – Colonial Blue.
 7. Grout Color: As selected by Architect from manufacturer's full range, to match existing.

8. Mounting: Factory, back mounted.

2.4 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, Type A, in maximum lengths available to minimize end-to-end butt joints.
 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. C-Cure.
 - b. Georgia-Pacific Gypsum LLC.
 - c. USG Corporation.
 2. Thickness: As required to match existing wall surface, min. 1/4 inch.

2.5 SETTING MATERIALS

- A. Standard Dry-Set Mortar (Thinset): ANSI A118.1.
 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. Bostik, Inc.
 - b. Custom Building Products.
 - c. LATICRETE SUPERCAP, LLC.
 - d. MAPEI Corporation.
 2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.1.

2.6 GROUT MATERIALS

- A. Sand-Portland Cement Grout: ANSI A108.10, consisting of white or gray cement and white or colored aggregate as required to produce color indicated.

2.7 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.8 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 CERAMIC TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - 1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
 - a. Tile floors consisting of tiles 8 by 8 inches or larger.
 - b. Tile floors consisting of rib-backed tiles.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 - 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 - 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Glazed Wall Tile: 1/16 inch.
 - 2. Porcelain Tile: 1/8 inch.

3.4 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.5 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
 - 1. Ceramic Tile Installation: TCNA F125-Full; thinset mortar on crack isolation membrane.
 - a. Ceramic Tile Type: Porcelain tile.
 - b. Thinset Mortar: Standard dry-set mortar.
 - c. Grout: Sand-portland cement grout.
- B. Interior Wall Installations, Masonry or Concrete:
 - 1. Ceramic Tile Installation: TCNA W202; thinset mortar.
 - a. Ceramic Tile Type: Glazed wall tile.
 - b. Thinset Mortar: Standard dry-set mortar.
 - c. Grout: Sand-portland cement grout.
- C. Interior Wall Installations, Wood or Metal Studs or Furring:
 - 1. Ceramic Tile Installation: TCNA W244C or TCNA W244F; thinset mortar on cementitious backer units or fiber-cement backer board.
 - a. Ceramic Tile Type: Glazed wall tile, or Porcelain 2" hexagon.
 - b. Thinset Mortar: Standard dry-set mortar.
 - c. Grout: Sand-portland cement grout.

END OF SECTION 093013

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. Portland cement plaster (stucco).
- B. Related Requirements:
 - 1. Section 055000 "Metal Fabrications" for shop priming metal fabrications.

1.2 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523, a matte flat finish.
- B. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523, an eggshell finish.
- C. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523, a satin-like finish.
- D. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523, a semi-gloss finish.
- E. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523, a gloss finish.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Indicate VOC content.
- B. 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. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.

- C. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.4 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.

1.5 QUALITY ASSURANCE

- A. Paint Contractor shall have documented experience in application of paints and coatings specified. Contractor shall maintain qualified painting crews during entire painting process.

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.
 - 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 paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Dunn-Edwards Corporation.
 - 2. Sherwin-Williams Company (The).
 - 3. Vista Paint Corporation.
 - 4. Or equal.

- B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Exterior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. 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 topcoat manufacturers for use in paint system and on substrate indicated.
- C. Colors: As selected by Architect from manufacturer's full range, to match existing.

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 Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Portland Cement Plaster: 12 percent.
- C. Portland Cement Plaster Substrates: Verify that plaster is fully cured.
- D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- E. 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 Architectural Painting Specification 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. 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.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification 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. Paint both sides and edges of exterior hollow metal doors and entire exposed surface of exterior hollow metal door frames.
 - 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 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.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed to view:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.

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. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

- A. Concrete and Portland Cement Plaster (Stucco), Nontraffic Surfaces as indicated on drawings:
1. Latex System:
 - a. Prime Coat: Primer sealer, latex, exterior: S-W Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils wet, 3.2 mils dry.

- b. Intermediate Coat: Latex, exterior, matching topcoat.
- c. Topcoat: Latex, exterior, satin: S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

END OF SECTION 099113

SECTION 10 14 23 - PANEL SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Panel signs.
- B. Related Requirements:
 - 1. Section 26 05 53 "Identification for Electrical Systems" for labels, tags, and nameplates for electrical equipment.

1.2 DEFINITIONS

- A. Accessible: In accordance with the accessibility standard.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For panel signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Include plans, elevations, and large-scale sections of typical members and other components.
 - 3. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 4. Show typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
- C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed color, pattern and surface finish.
 - 1. Include representative Samples of available typestyles and graphic symbols.
- D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
 - 1. Panel Signs: Full-size Sample.
- E. Sign Schedule: Use same designations specified or indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Single Source Responsibility: For each separate sign type required, obtain signs from one source of a single manufacturer.

1.7 WARRANTY

- A. Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
 - 2. Warranty Period: one year from date of shipping.

PART 2 - PRODUCTS

2.1 PANEL SIGNS, GENERAL

- A. Panel Signs: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
 - 1. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16-inch measured diagonally.
- B. Unframed Panel Signs: Fabricate signs with edges mechanically and smoothly finished to conform with the following requirements:
 - 1. Edge Condition: Beveled.

2. Corner Condition: Corners rounded to a 3/8-inch radius.
- C. Graphic Content and Style: Provide sign copy that complies with the requirements indicated for size, style, spacing, content, position, material, finishes, and colors of letters, numbers, and other graphic devices.
- D. Raised Copy: Produce precisely formed characters with square cut edges free from burrs and cut marks. Character height, spacing, proportions, braille, etc. per CBC 11B-703.

2.2 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: For exterior signs, allow for thermal movements from ambient and surface temperature changes.
 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- B. Accessibility Standard: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and CBC for signs.

2.3 PANEL SIGNS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. ASI Sign Systems, Inc.
 2. Best Sign Systems, Inc.
 3. Vomar Products, Inc.
 4. Or equal.
- B. 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 "Surface Finish and Applied Flat Graphics" Subparagraph below and as follows:
 - a. Thickness: 0.080 inch.
 - b. Surface-Applied Flat Graphics: Applied baked enamel or powder coat.
 2. Sign-Panel Perimeter: Finish edges smooth.
 - a. Edge Condition: Beveled.
 - b. Corner Condition in Elevation: Rounded to radius indicated.
 3. Mounting: As indicated with concealed anchors. Fence mount as indicated.

4. Surface Finish and Applied Graphics:
 - a. Integral Acrylic Sheet Color: As selected by Architect from full range of industry colors.
 - b. Overcoat: Manufacturer's standard baked-on clear coating.
5. Text and Typeface: Accessible raised characters and Braille typeface as selected by Architect from manufacturer's full range. Finish Braille to match background color.
6. Flatness Tolerance: Sign panel shall remain flat or uniformly curved under installed conditions as indicated and within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner.

2.4 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.

2.5 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
 1. Use concealed fasteners and anchors unless indicated to be exposed.
 2. For exterior exposure, furnish nonferrous-metal unless otherwise indicated.
 3. Exposed Metal-Fastener Components, General:
 - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
 - b. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish insets, as required, to be set into concrete or masonry work.

2.6 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
 1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.

3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
4. Internally brace signs for stability and for securing fasteners.
5. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes'.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches as selected by the Architect from manufacturer's full range.
- E. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

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. Verify that anchor inserts are correctly sized and located to accommodate signs.
- D. 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.

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. Remove temporary protective coverings and strippable films as signs are installed.
- C. 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 District.

END OF SECTION 10 14 23

SECTION 101426 - POST AND PANEL SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Nonilluminated post-and-panel signs.

B. Related Requirements:

1. Section 033310 "Structural and Civil Concrete" for concrete foundations, concrete fill in postholes, and setting anchor bolts in concrete foundations for signs.
2. Section 101423 "Panel Signage" and for wall-mounted sign panels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For signage.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
3. Show message list, typestyles, graphic elements, and layout for each sign at least half size.

C. Samples for Verification: For each type of sign assembly, showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:

1. Post-and-Panel Signs: Full-size Sample.
2. Exposed Accessories: Full-size Sample of each accessory type.
3. Full-size Samples, if approved, will be returned to Contractor for use in Project.

D. Product Schedule: For post-and-panel signs. Use same designations indicated on Drawings or specified.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

B. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Signs and supporting elements shall withstand the effects of gravity and other loads within limits and under conditions indicated.
 - 1. Uniform Wind Load: As indicated on Drawings.
- B. Thermal Movements: For exterior signs, allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- C. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design".

2.2 POST-AND-PANEL SIGNS

- A. Post-and-Panel Sign: Sign of single-panel configuration; with smooth, uniform surfaces and support assembly; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. [APCO Graphics, Inc.](#)
 - b. [ASI Sign Systems, Inc.](#)
 - c. [Vomar Products, Inc.](#)

2. Solid-Sheet Sign Panels: Aluminum sheet with finish specified in "Sign-Panel-Face Finish and Applied Graphics" Subparagraph and as follows:
 - a. Thickness: Manufacturer's standard for size of sign.
 - b. Surface-Applied Graphics: Applied baked enamel or powder coat.
3. Posts: Galvanized Steel.
 - a. Shape: Round.
 - b. Size: 2-inch diameter.
 - c. Installation Method: Sleeve.
 - d. Finish and Color: Mill.
4. Sign-Panel-Face Finish and Applied Graphics:
 - a. Integral Metal Finish: As indicated by manufacturer's designation.
 - b. Overcoat: Manufacturer's standard baked-on clear coating.
5. Text and Typeface:
 - a. Character Type: Characters on signs shall be sans serif uppercase characters.
 - b. Character Height (per CBC 11B-703.2.5): Characters shall be a minimum of 5/8-inch and a maximum of 2-inches high, based on the height of the uppercase letter 'I'.
 - c. Finish and Contrast (per CBC 11B-703.5.1): Contrast between character, symbols and their background must be non-glare, either light characters on dark background or dark characters on light background.
 - d. Proportions (per CBC 11B-703.4 and CBC 11B-703.6): Characters on signs shall have an uppercase letter 'O' that is 60 percent minimum and 110 percent maximum of the height of the uppercase letter 'I'. Stroke thickness of the uppercase letter 'I' shall be 15 percent maximum of the height of the character.
 - e. Character Spacing (per CBC 11B-703.2.7): Character spacing shall be measured between the two closest points of adjacent raised characters within a message, excluding word spaces. Where characters have rectangular cross sections, spacing between individual raised characters shall be 1/8-inch minimum and 4 times the raised character stroke width maximum. Where characters have other cross section, spacing between individual raised characters shall be 1/16-inch minimum and 4 times the raised character stroke width maximum at the base of the cross sections, and 1/8-inch minimum and 4 times the raised character stroke width maximum at the top of the cross sections. Characters shall be separated from raised borders and decorative elements 3/8-inch minimum.
 - f. Line Spacing (per CBC 11B-703.2.8): Spacing between the baselines of separate lines of characters within a message shall be 135 percent minimum and 170 percent maximum of the raised character height.

2.3 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. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Steel Materials:
 - 1. Hot-Rolled, Structural-Steel Shapes: ASTM A 36/A 36M or ASTM A 529/A 529M.
 - 2. Steel Members Fabricated from Plate or Bar Stock: ASTM A 529/A 529M or ASTM A 572/A 572M, 42,000-psi minimum yield strength.
 - 3. Steel Tubing or Pipe: ASTM A 500/A 500M, Grade B.
 - 4. Bolts for Steel Framing: ASTM A 307 or ASTM A 325 as necessary for design loads and connection details.
 - 5. For steel exposed to view on completion, provide materials having flat, smooth surfaces without blemishes. Do not use materials whose surfaces exhibit pitting, seam marks, roller marks, rolled trade names, or roughness.
- D. Vinyl Film: UV-resistant vinyl film of nominal thickness indicated, with pressure-sensitive, permanent adhesive on back; die cut to form characters or images as indicated on Drawings and suitable for exterior applications.
- E. 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.

2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following unless otherwise indicated:
 - 1. Use concealed fasteners and anchors unless indicated to be exposed.
 - 2. For exterior exposure, furnish nonferrous-metal stainless-steel devices unless otherwise indicated.
 - 3. Exposed Metal-Fastener Components, General:
 - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
 - b. Fastener Heads: For nonstructural connections, use oval countersunk screws and bolts with tamper-resistant, Allen-head slots unless otherwise indicated.
 - 4. Inserts: Furnish inserts to be set by other installers into concrete or masonry work.
- B. Anchoring Materials:

1. 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.
2. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
 - a. Water-Resistant Product: At exterior locations, provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.5 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
 1. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in locations concealed from view after final assembly.
 2. Mill joints to tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed joints of flux, and dress exposed and contact surfaces.
 4. Conceal fasteners and anchors unless indicated to be exposed; locate exposed fasteners where they will be inconspicuous.
 5. Internally brace signs for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.
- B. Sign Message Panels: Construct sign-panel surfaces to be smooth and to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner.
 1. Increase panel thickness or reinforce with concealed stiffeners or backing materials as needed to produce surfaces without distortion, buckles, warp, or other surface deformations.
- C. Post Fabrication: Fabricate posts designed for structural performance indicated and of lengths required for installation method indicated for each sign.
 1. Steel Posts: Fabricate from minimum 0.120-inch- thick, steel tubing unless otherwise indicated. Include post caps, fillers, spacers, junction boxes, access panels, reinforcement where required for loading conditions, and related accessories required for complete installation.
 - a. Hot-dip galvanize post assemblies after fabrication according to ASTM A 123/A 123M.

2. Sleeves: Fabricate posts 12 inches longer than height of sign to permit embedment in sleeves cast in concrete foundations or concrete-filled postholes. Provide sleeves by manufacturer, sized to receive outside diameter of posts. Size sleeves for direct embedment in concrete foundations or concrete-filled postholes and to prevent sign movement, but not less than 24 inches for embedment.

2.6 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.

2.7 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.

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 the Work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install signs using installation methods indicated and according to manufacturer's written instructions.
 1. Install signs level, plumb, 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 components 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 or neoprene gaskets.

3.3 INSTALLING POSTS

- A. Vertical Tolerance: Set posts plumb within a tolerance of 1/16 inch in 3 feet.
- B. Sleeve Method: Set post in position in sleeve and support post to prevent movement, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with manufacturer's written instructions.
 - 1. Leave anchorage joint exposed with anchoring material flush with adjacent surface.

3.4 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. Remove temporary protective coverings and strippable films as signs are installed.
- C. 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 101426

SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Public-use washroom accessories.
 - 2. Warm-air dryers.
 - 3. Under-lavatory guards.
 - 4. Custodial accessories.

- B. Related Requirements:
 - 1. Section 09 30 13 "Ceramic Tiling".

1.2 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

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.
 - 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Include electrical characteristics.

- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated.
 - 2. Identify accessories using designations indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For accessories to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Regulatory Requirements: Install toilet and bath accessories per ADA-ABA and CBC Title 24 access requirements.
 - 1. Accessible toilet accessories shall be mounted at heights and at horizontal locations according to CBC Title 24.

1.7 WARRANTY

- A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, visible silver spoilage defects.
 - 2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- 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.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer.
 - 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. American Specialties, Inc.
 - b. Bobrick Washroom Equipment, Inc.

- c. [Bradley Corporation.](#)
- d. Or equal.

B. Grab Bar:

- 1. Basis of Design: Bobrick B-6806.
- 2. Mounting: Flanges with concealed fasteners.
- 3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4 finish (satin).
- 4. Outside Diameter: 1-1/2 inches.
- 5. Configuration and Length: As indicated on Drawings.
- 6.

C. Mirror Unit:

- 1. Basis of Design: Bobrick B-1658
- 2. Frame: Stainless-steel channel.
 - a. Corners: Mitered and mechanically interlocked.
- 3. Size: 18-inches wide x 30-inches high.
- 4. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.

2.3 PUBLIC-USE SHOWER ROOM ACCESSORIES

A. Source Limitations: Obtain public-use shower room accessories from single source from single manufacturer.

B. Folding Shower Seat:

- 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. [American Specialties, Inc.](#)
 - b. [Bobrick Washroom Equipment, Inc.](#)
 - c. [Bradley Corporation.](#)
 - d. Or equal.
- 2. Configuration: Rectangular seat.
- 3. Seat: Phenolic or polymeric composite of slat-type or one-piece construction in color as selected by Architect.

4. Mounting Mechanism: Stainless steel, No. 4 finish (satin).
5. Dimensions: 18" x 15".

2.4 WARM-AIR DRYERS

- A. Source Limitations: Obtain warm-air dryers from single source from single manufacturer.
- B. Warm-Air Dryer:
 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. Dyson.
 - b. World Dryer Corporation.
 - c. Bobrick Washroom Equipment, Inc.
 - d. Or equal.
 2. Basis of Design: Dyson airblade V (to match existing)
 3. Description: High-speed, warm-air hand dryer.
 4. Mounting: Surface mounted, with low-profile design, 4" max.
 5. Operation: Sensor activated with timed power cut-off switch.
 - a. Operation Time: 30 seconds.
 6. Cover Material and Finish: White.
 7. Electrical Requirements: 120 V, 7.3 A, 1400 W.

2.5 UNDER-LAVATORY GUARDS

- A. Under-lavatory Guard:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Plumberex Specialty Products, Inc.
 - b. Truebro by IPS Corporation.
 - c. Or equal.
 2. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
 3. Material and Finish: Antimicrobial, molded plastic, white.

2.6 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- C. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- D. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.7 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Construction Manager.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Provide backing where basic substrate is not sufficient to support accessory without additional material.
- C. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION 10 28 00

SECTION 13 11 01

SWIMMING POOL EXCAVATION

PART 1 GENERAL

1.01 DESCRIPTION

- A. Finish and fine grading to bring the surface of the ground to the required grades and elevations as indicated on the Drawings.
- B. Subgrade improvements and placing of compacted fills.
- C. Excavation and backfill for all swimming pool, pool deck, surge chamber and backwash retention tank structural requirements, including footings, foundations, slabs and walls.

1.02 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies: Conform with requirements of the General Conditions, and more specifically the following:
 - 1. Comply with California Building Code, latest edition.
 - 2. Comply with applicable construction safety orders, latest edition, Federal and State OSHA.
 - 3. Comply with applicable trench safety provisions, latest edition, Federal and State OSHA.
- B. Qualifications of Workers:
 - 1. The entity performing the work of this Section shall have been successfully engaged in the respective trade prior to commencement of the Work.
 - 2. For actual construction operations, use only trained and experienced workers with experience with the materials and methods specified.

3. Provide at least one person who shall be present at all times during execution of the work of this Section, with experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.

C. Project/Site Conditions:

1. Be familiar with site and subsurface conditions.
2. Excavation is unclassified and includes excavation to sub-grade elevations indicated or necessary, regardless of character of materials and obstructions encountered.
3. Provisions for mitigation of wet soils due to seepage or rain shall be made during excavation and throughout construction. If wet soils are encountered within the swimming pool excavations, de-watering shall be provided.
4. Where slope instability is encountered, all excavations within those areas shall be 1:1 or flatter. Forming of vertical walls may be necessary, and all soil conditions shall be reviewed by the Resident Engineer.
5. Refer to General Conditions, Section 01 73 00.

D. Adverse Weather Conditions:

1. During the periods when site soil moisture content is substantially in excess of moisture content required for optimum compaction, do not perform fill compaction.
2. When unfavorable weather conditions necessitate interrupting filling and grading operations, prepare areas by compaction of surface and grading to avoid collection of water. Provide adequate temporary drainage to prevent erosion.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. Provide submittals in conformance with requirements of The "Whitebook".
- B. Required submittals include:
 1. Offsite fill material, if applicable.

- C. Submit proof of qualifications as specified in Article 1.02.B of this Section.

1.04 EXCAVATING & TRENCHING, GENERAL REQUIREMENTS

- A. All trenches, holes, etc. are to be completely protected using solid barricades, steel plates, and plywood both during construction and during off hours, including night time.
- B. Flashing warning light barricades are required on sidewalks, roads, and any other critical areas that require night time protection.
- C. Roads, paths and sidewalks shall not be blocked at any time or in any way. Trenching across roads, paths or sidewalks involves special instructions and review of the construction procedure by the Owner at least three (3) days prior to the Work actually being started.
- D. Construction equipment, including all trucks, cars, etc. shall not be parked or driven on roads, paths or sidewalks. Items not allowed on roads, paths or sidewalks include hoses, power cords, ropes, construction materials, dirt and debris, etc.
- E. All roads, paths and sidewalks must remain clear and the Contractor shall maintain temporary safe and effective pedestrian access at all times.
- F. Drawings show existing major underground utilities using the best information available. The Contractor shall also fully check public works reference drawings prior to excavation. Call local Dig Alert to locate utilities to ensure safety.

PART 2 PRODUCTS

2.01 MATERIALS

- A. On-site Fill Material: All on-site fill material shall be soil or soil-rock mixture which is free from organic matter and other deleterious substances; it shall contain no rocks or lumps over three (3) inches in greatest dimension and not more than fifteen percent (15%) of the rocks or lumps shall be larger than two (2) inches in greatest

dimension. Material from the pool excavations may not be acceptable native fill material.

- B. Imported Fill Material: All imported fill material shall meet the requirements of Paragraph 2.01(A) and 2.01(B) above and shall in addition, be predominately granular and non-expansive, with a maximum particle size of three (3) inches.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify drawing dimensions and elevations with actual field conditions. Inspect related Work and adjacent surfaces and report discrepancies and conditions which prevent proper execution of the Work to the Resident Engineer.

3.02 SUBGRADE IMPROVEMENTS

- A. Clearing: Strip site area (as defined within the Drawings) of any topsoil containing vegetation, trees and roots, organic matter, and other debris, and dispose of as specified.
- B. Placement of Fills: Place fill, consisting of approved soils, clean and free of all vegetation, debris, and rocks larger than three (3) inches, in uniform six (6) inch lifts. Fill to be compacted at optimum moisture to ninety-five percent (95%) maximum density with approved mechanical compaction equipment.

3.03 EXCAVATION

- A. Checking Layout: Contractor shall, before commencing the excavation work, check all lines, stakes and levels for dimensions, angles, elevations and grades with the survey.
- B. Over-Excavation:
 - 1. Excavate for footings, foundations, grade beams and slabs to depths indicated on Drawings. Elevations and depths of excavations shown on the Drawings

shall govern and will be basis for bidding and execution of work except as otherwise may be directed by the Resident Engineer. Greater or lesser quantities of excavation and backfill required by authorized instructions shall be adjusted in accordance with the General Conditions.

2. In areas where proposed swimming pool decking is anticipated, the site should be excavated to a depth of one (1) foot below existing grade and backfilled with compacted engineered fill. The intent of this recommendation is to remove soils susceptible to compressibility.
 3. Except where extra excavation is directed by the Resident Engineer, excavations made to a greater depth or size than indicated or required shall be filled with concrete or shotcrete as specified in Sections 13 11 02 / 13 11 03.
- C. Dimensions: Excavate to proper dimensions as shown, cut square and smooth with firm level bottoms. Excavations shall be free of loose or disturbed materials.
 - D. Excess Water Control: Keep all excavations free from standing water by pumping, draining or providing proper protection against water intrusion. If soil becomes soft, soggy or saturated, perform additional excavation to firm soil not affected by water.
 - E. Form Removal: Make all excavations of sufficient size to permit installation and removal of forms and all other required work.
 - F. Alternate Forming: Sides of structures may be formed by neat excavations where banks will stand without caving. If banks cave, provide forming as required and widen excavation to permit forming, bracing and inspection. Provide forming in conformance with Section 13 11 02 and all recognized safety standards. Form all grade beams.

3.04 BACKFILLING

- A. Method: After concrete has been placed, forms removed and concrete work approved, backfill the excavations with earth to indicated or required grades. Carry on backfilling simultaneously on each side of walls or grade beams. Remove all rubbish and wood from the excavations before placing backfill.
- B. Concrete Protection: Prior to placing any backfill, adequately cure all concrete and provide any bracing required to ensure the stability of the structure. Protect waterproofing and dampproofing against damage in a manner acceptable to the Owner's Representative. Remove bracing as backfill operations progress.
- C. Material: Use the material from the excavations for backfilling, subject to approval by Soils Testing Agency. The earth shall be free from debris, large clods or stones.

- D. Lifts: Place backfill in six (6) inch loose layers, bring to optimum moisture content and compact to ninety percent (90%) of maximum density, sloping down and away from the structures being backfilled.

- E. Moisture: Rigidly control the amount of water used to insure optimum moisture conditions for the type of fill material used. Excessive amounts of water causing saturation of earth will not be permitted. Compaction by flooding or jetting is prohibited.

3.05 GRADING

- A. Slopes: Grade to finish grades indicated on Drawings, with uniform slopes between all points.

- B. Subgrades: Blade to required grade and roll or tamp subgrades for exterior slabs, decks and paving.

3.06 CLEAN-UP

- A. Disposal: Haul away rubbish, debris, and rocks from site promptly and dispose of legally. Burning rubbish on site is prohibited.

- B. Dust and Noise Abatement: During entire period of construction keep area and material being loaded sprinkled to reduce dust in air and annoyance to premises and surrounding property.

PART 1 - END OF SECTION

PART 1 - SECTION 13 11 02
SWIMMING POOL CONCRETE

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Forming for cast-in-place concrete and shotcrete associated with swimming pools and pool decks.
- B. Reinforcement for cast-in-place concrete and shotcrete associated with swimming pools and pool decks.
- C. Cast-in-place concrete for swimming pool structures. Do not use waterproofing admixture of any kind.
- D. Cast-in-place concrete for swimming pool decks with Xypex C-500 crystalline waterproofing admixture. Waterproofing admixture for swimming pool decks only.
- E. Provide labor, materials and equipment as required to install sealant for all pool deck expansion joints, or any other caulking, as indicated on the aquatic Drawings and herein specified.

1.02 QUALITY ASSURANCE

- A. Qualifications of Workers:
 - 1. The entity performing the work of this Section shall have been successfully engaged in the respective trade prior to commencement of the Work.
 - 2. For actual construction operations, use only trained and experienced workers with experience with the materials and methods specified.
 - 3. Provide at least one person who shall be present at all times during execution of the work of this Section, with experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.
- B. Standards:
 - 1. In addition to complying with the California Building Code (latest edition), comply with all pertinent recommendations contained in "Recommended Practice for Concrete Formwork," Publication ACI 347-78 of the American Concrete Institute.

2. In addition to complying with California Building Code (latest edition), comply with all pertinent recommendations contained in "Manual of Standard Practice for Detailing Reinforced Concrete Structures," Publication ACI 315-74 of the American Concrete Institute.
 3. In addition to complying with all local codes and regulations, comply with all pertinent recommendations contained in American Society for Testing and materials (ASTM); ASTM C 920 "Standard Specification for Elastometric Joint Sealants."
- C. Tolerances: Construct all swimming pool concrete straight, true, plumb and square within a tolerance horizontally of one in 200 and vertically of one in 2000.

1.03 SUBMITTAL AND SUBSTITUTIONS

- A. Provide submittals in conformance with the requirements of The "Whitebook".
- B. Samples and Certificates, Concrete Reinforcement:
1. All material shall bear mill tags with heat number identification. Mill analysis and report shall be made available upon request.
 2. Material not so labeled and identifiable may be required by the Owner to be tested by the testing laboratory selected by the Owner and at no additional cost to the Owner, in which case random samples will be taken for one series of tests from each 2-1/2 tons or fraction thereof of each size and kind of reinforcing steel.
 3. Design mix from batch plant demonstrating previous use history and associated strengths at 28 days.
 4. The Contractor shall submit a mix design stamped and signed by a licensed engineer for approval by the Owner's Representative prior to any placement of concrete.
 5. The Contractor shall submit a separate mix design stamped and signed by a licensed engineer for the swimming pool decks which contains the specified Xypex C-500 crystalline waterproofing admixture for approval by the Owner's Representative prior to any placement of concrete.
- C. Submit proof of qualifications as specified in Article 1.02.A of this Section.
- D. Submit reinforcing shop drawings for pool walls, gutters, floors, dike walls and balance tank, etc. as shown on the construction drawing.

1.04 PRODUCT HANDLING

- A. Delivery: Deliver materials to the Project Site in the manufacturer's original unopened containers with all labels intact and legible.
- B. Storage: Store materials under cover in a manner to prevent damage and contamination, and store only the specified materials at the Project Site.
- C. Protection: Use all means necessary to protect the swimming pool concrete before, during, and after installation and to protect the installed Work specified in other Sections.
- D. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner.

PART 2 PRODUCTS

2.01 CONCRETE FORMWORK

A. Form Materials:

- 1. Form Lumber: All form lumber in contact with exposed concrete shall be new except as allowed for reuse of forms in Part 3 of this Section, and all form lumber shall be one of the following, a combination thereof, or an equal approved in advance by the Owner's Representative.
 - a. "Plyform," Class I or II, bearing the label of the Douglas Fir Plywood Association; "Inner-Seal" Form as manufactured by Louisiana-Pacific, or approved equal.
 - b. Douglas Fir-Larch, number two grade, seasoned, surfaced four sides.
- 2. Form Release Agent: Colorless, non-staining, free from oils; chemically reactive agent that shall not impair bonding of paint or other coatings intended for use.

B. Ties and Spreaders:

- 1. Type: All form ties shall be a type which do not leave an open hole through the concrete and which permits neat and solid patching at every hole.
- 2. Design: When forms are removed, all metal reinforcement shall be not less than two (2) inches from the finished concrete surface.
- 3. Wire Ties and Wood Spreaders: Do not use wire ties or wood spreaders.

C. Alternate Forming Systems: Alternate forming systems may be used subject to the

advance approval of the Owner's Representative.

2.02 CONCRETE REINFORCEMENT

- A. Bars: Bars for reinforcement shall conform to "Specifications for Deformed Billet-Steel Bars for Concrete Reinforcement," ASTM A-615, Grade 60.
- B. Wire Fabric: Wire fabric shall conform to "Specifications for Wire Fabric for Concrete Reinforcement," ASTM A-185.
- C. Tie Wire: Tie wire for reinforcement shall conform to "Specifications for Cold-drawn Steel Wire for Concrete Reinforcement," ASTM A-82 black annealed 16-gauge tie wire.

2.03 CAST-IN-PLACE CONCRETE

- A. Concrete:
 - 1. All concrete, unless otherwise specifically permitted by the Owner's Representative, shall be transit-mixed in accordance with ASTM C94. Concrete for water retaining structures that do not receive a waterproofing finish such as ceramic tile or swimming pool plaster shall receive a topical waterproofing finish.
 - 2. The control of concrete production shall be under the supervision of a recognized testing agency, selected by the Owner in accordance with The "Whitebook".
 - 3. Quality: All concrete shall have the following minimum compressive strengths at twenty-eight (28) days and shall be proportioned within the following limits:
 - a. 3,000 psi minimum compressive strength for cast-in-place concrete swimming pool structures.
 - b. 4,000 psi minimum compressive strength for cast-in-place swimming pool decks with Xypex C-500 waterproofing admixture.
 - c. 1" maximum size aggregate.
 - d. 6.0 minimum sacks of cement per cubic yard.*
 - e. Maximum water to cement ratio of 0.55.
 - f. 4" maximum slump.
 - g. Xypex Admix C-500 2% - 2.5% by weight of cement content. Contact Xypex Technical Services to confirm dosage. (To be used for swimming pool decks only.)
- * For estimate only: to be determined by mix design.

4. Cement: All cement shall be Portland Cement conforming to ASTM C-150, Type II or V and shall be the product of one manufacturer.
5. Aggregates:
 - a. Shall conform to "Standard Specifications for Concrete Aggregates," ASTM C33, except as modified herein.
 - b. Coarse Aggregate: Clean sound washed gravel or crushed rock. Crushing may constitute not more than 30% of the total coarse aggregate volume. Not more than 5% flat, thin, elongated or laminated material nor more than 1% deleterious material shall be present. 1" aggregate graded from 1/4" to 1", fineness modulus 6.90 to 7.40. 1-1/2" graded from 1/2" to 1-1/2", fineness modulus 7.80 to 8.20.
 - c. Fine Aggregate: Washed natural sand of hard, strong particles and shall contain not more than 1% of deleterious material, fineness modulus 2.65 to 3.05.
 - d. Aggregate must be certified, non-expansive from a "known" good source.
6. Water: Clean, fresh, free from acid, alkali, organic matter or other impurities liable to be detrimental to the concrete (potable).
7. Admixtures: Admixtures shall be used upon approval of the Owner's Representative.
 - a. Air-entraining admixture: Conform to ASTM C260.
 - b. Water-reducing admixture: Conform to ASTM C494.
 - C Waterproofing admixture for swimming pool decks only: Xypex Admix C-500, No substitutions permitted. Conform to ASTM C494.
8. Xypex Admix C-500 Dosage: To be used for swimming pool decks only.
 - a. General: Xypex Admix must be added to concrete mix at time of batching. It is important to obtain a homogeneous mixture of Xypex Admix with the concrete. Do not add dry Admix powder directly to wet mixed concrete as this could cause clumping and thorough dispersion may not occur.
 - b. Dosage Rate: Under normal conditions, the crystalline waterproofing powder shall be added to the concrete mix at the following rates:
 - 1.) Xypex Admix C-500 2% – 2.5% by weight of cement content

- c. Weather Conditions: For mixing, transporting and placing concrete under conditions of high temperature or low temperature, follow concrete practices such as those referred to in ACI 305R (Hot Weather Concreting) and ACI 306R (Cold Weather Concreting) or other applicable standards.
- d. Concrete Batching & Mixing Procedures: Procedures for the addition of Xypex admixture will vary according to type of batch plant operation and equipment. Prior to the placement of any concrete, the concrete batch plant and the contractor shall be responsible to consult with the local Xypex representative concerning additional procedures for the addition, mixing and to confirm dosage.

Note: For enhanced chemical protection or for meeting specific project requirements or where the concrete mix design contains higher than 25% type F fly ash content or includes a Portland cement/slag cement/type C fly ash blend, consult with manufacturer or its authorized representative to determine appropriate dosage rates.

- B. Construction Joints: Use keyform for slab pour joints. Either preformed galvanized or PVC construction joint forms of a standard manufacturer may be used. Install per manufacturer's recommendations and tool edges of slabs.
- C. Waterstops: PVC bulb-type for use between concrete pours / lifts, conforming with ASTM D 570, D 624, and D 638. Provide in configuration(s) as recommended by manufacturer for specific application. Greenstreak, W.R. Meadows, or approved equal.
- D. Curing Materials:
 - 1. Liquid Membrane (covered slab): Chlorinated rubber membrane forming, curing-sealing compound conforming to ASTM C309.
 - 2. Liquid Membrane (exposed slab): Clear methyl and butyl methacrylate non-staining, membrane forming, curing-sealing compound conforming to ASTM C309.
- E. Cement Grout and Drypack:
 - 1. Cement Grout: Mix 1 part by volume of Portland Cement, 1/2 part by volume of water and fine aggregate enough to make mixture flow under its' own weight.
 - 2. Drypack: Mix 1 part by volume of Portland Cement, 1/2 part by volume of water and fine aggregate enough to make a stiff mix that will mold into a ball. Mix no more than can be used in 30 minutes.

2.04 JOINT SEALANT MATERIALS

- A. Caulking: Multipart, non-sag gun grade polyurethane based sealant meeting the requirements of ASTM C920-02, Type S or M, Mamemco International, Pecora, Sika Corp., Sonneborn Building Products, Tremco or approved equal. Self leveling caulking materials are not allowed.
- B. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- C. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- D. Sealant Backer Rod: Provide compressible polyethylene or polyurethane backer rod as recommended by the sealant manufacturer.
- E. Bond Breaker Tape: Provide polyethylene tape or other plastic tape as recommended by sealant manufacturer, to be applied to sealant-contact surfaces where bond to substrate or joint filler must be avoided for proper performance of sealant.
- F. Sand: Cover the surface of the caulking with #30 silica sand.

2.05 OTHER MATERIALS

- A. All other materials, not specifically described but required for proper completion of the work of this Section, shall be as selected by the Contractor subject to the advance review by the Owner's Representative.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection:
 - 1. Prior to all Work of this Section, carefully inspect the installed Work of other trades and verify that all such Work is complete to the point where this installation may properly commence.
 - 2. Verify that all Work may be constructed in accordance with all applicable codes and regulations, the referenced standards, and the original design.
- B. Discrepancies:
 - 1. In the event of discrepancy, immediately notify the Owner's Representative.
 - 2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3. Failure to notify the Owner's Representative and give written notice of discrepancies shall constitute acceptance by the Contractor of existing conditions as fit and proper to receive work.

3.02 CONCRETE FORMWORK

A. Construction of Forms:

1. General: Construct all required forms to be substantial, sufficiently tight to prevent leakage of concrete paste, and able to withstand excessive deflection when filled with wet concrete.
2. Layout:
 - a. Form for all required cast-in-place concrete to the shapes, sizes, lines and dimensions indicated on the Drawings.
 - b. Exercise particular care in the layout of forms to avoid necessity for cutting concrete after placement.
 - c. Make proper provisions for all openings, offsets, recesses, anchorages, blocking and other features of the Work as shown or required.
 - d. Perform all forming required for Work of other trades and do all cutting and repairing of forms required to permit such installation.
 - e. Carefully examine the Drawings and Specifications and consult with other trades as required relative to providing for pipe and conduit penetrations, reglets, chases and other items in the forms.
3. Imbedded Items: Set all required steel frames, angles, bolts, inserts and other such items required to be anchored in the concrete prior to concrete being placed.
4. Bracings:
 - a. Properly brace and tie the forms together so as to maintain position and shape and to ensure safety to workmen.
 - b. Construct all bracing, supporting members and centering of ample size and strength to safely carry, without excessive deflection, all dead and live loads to which they may be subjected.
 - c. Properly space the forms apart and securely tie them together, using metal spreader ties that give positive tying and accurate spreading.
5. Wetting: Keep forms sufficiently wetted to prevent joints from opening up before concrete is placed.

B. Plywood Forms:

1. Design: Nail the plywood panels directly to studs and apply in a manner to

- minimize the number of joints.
2. Joints: Make all panel joints tight butt joints with all edges true and square.

C. Footing Forms:

1. Wood Forms: All footing forms shall be wood unless otherwise specifically approved by the Owner's Representative, or as specified in paragraph 3.02(C)(2).
2. Earth Forms:
 - a. Side walls for footings may be of earth provided the soil will stand without caving and the sides of the bank are made with a neat cut to the minimum dimensions indicated on the Drawings.
 - b. For excavation and backfill of earth forms, conform with applicable provisions of Section 13 11 01.

D. Reuse of Forms:

1. Reuse of forms shall be subject to advance approval of the Owner's Representative.
2. Except as specifically approved in advance by the Owner's Representative, reuse of forms shall in no way delay or change the schedule for placement of concrete from the schedule obtainable if all forms were new.
3. Except as specifically approved in advance by the Owner's Representative, reuse of forms shall in no way impart less structural stability to the forms nor less acceptable appearance to finished concrete.

E. Removal of Forms:

1. General:
 - a. In general, side forms of footings may be removed seven (7) days after placement of concrete, but time may be extended if deemed necessary by the Owner's Representative.
 - b. Forms for footings, foundations, grade beams, slabs, walls, and other formed concrete may be removed fourteen (14) days after placement of concrete.
2. Removal:
 - a. Use all means necessary to protect workers, passersby, the installed Work of other trades and the complete safety of the structure.
 - b. Cut nails and tie wires or form ties off flush, and leave all surfaces smooth and clean.

- c. Remove metal spreader ties on exposed concrete by removing or snapping off inside the wall surface and pointing up and rubbing the resulting pockets to match the surrounding areas.
- d. Flush all holes resulting from the use of spreader ties and sleeve nuts using water, and then solidly pack throughout the wall thickness with cement grout applied under pressure by means of a grouting gun; grout shall be one part Portland Cement to 2-1/2 parts sand; apply grout immediately after removing forms.

3.03 CONCRETE REINFORCEMENT

A. Bending:

1. General:

- a. Fabricate all reinforcement in strict accordance with the Drawings.
- b. Do not use bars with kinks or bends not shown on the Drawings.
- c. Do not bend or straighten steel in a manner that will injure the material. (When opposite end is already encased in concrete.)

2. Design:

- a. Bend all bars cold.
- b. Make bends for stirrups and ties around a pin having a diameter of not less than two (2) times the minimum thickness of the bar.
- c. Make bends for other bars, including hooks, around a pin having a diameter of not less than six (6) times the minimum thickness of the bar.

B. Placing:

- 1. General: Before the start of concrete placement, accurately place all concrete reinforcement, positively securing and supporting by concrete blocks, metal chairs or spacers, or by metal hangers.

2. Clearance:

- a. Preserve clear space between bars of not less than one and one-half (1-1/2) times the nominal diameter of the round bars.
- b. In no case let the clear space be less than one and one-half (1-1/2) inches nor less than one and one-third (1-1/3) times the maximum size of the aggregate.
- c. Provide the following minimum concrete covering of reinforcement:

- 1) Concrete deposited against earth: three (3) inches minimum.
- 2) Concrete below grade deposited against forms: two (2) inches minimum.
- 3) Concrete elsewhere: As indicated on Drawings or otherwise approved by the Owner's Representative.

3. Splicing:

a. Horizontal Bars:

- 1) Place bars in horizontal members with minimum lap at splices sufficient to develop the strength of the bars.
- 2) Bars may be wired together at laps except at points of support of the member, at which points preserve clear space described above.
- 3) Whenever possible, stagger the splices of adjacent bars.
- 4) Splice forty (40) bar diameters minimum.
- 5) Provide non-contact lap slices for shotcrete.

b. Wire Fabric: Make all splices in wire fabric at least one and one-half (1-1/2) meshes wide.

c. Other Splices: Make only those other splices that are indicated on the Drawings or specifically approved by the Owner's Representative.

4. Dowels: Place all required steel dowels and securely anchor them into position before concrete is placed.

5. Obstructions: In the event conduits, piping, inserts, sleeves and other items interfere with placing reinforcement as indicated on the Drawings or otherwise required, immediately consult with the Owner's Representative and obtain approval of a new procedure prior to placing concrete.

C. Cleaning Reinforcement: Steel reinforcement, at the time concrete is placed around it, shall be free from rust scale, loose mill scale, oil, paint and all other coatings which will destroy or reduce the bond between steel and concrete. Bend down all tie wire away from the top of the pool deck. Maintain a 2" clear from top of concrete to the tie wire.

3.04 SHOTCRETE REINFORCEMENT

A. The maximum size of reinforcement shall be No. 5 bars unless it can be demonstrated by preconstruction tests that adequate encasement of larger bars can

be achieved. When No. 5 or smaller bars are used, there shall be a minimum clearance between parallel reinforcement bars of 2-1/2 inches (64 mm). When bars larger than No. 5 are permitted, there shall be a minimum clearance between parallel bars equal to six diameters of the bars used. When two curtains of steel are provided, the curtain nearest the nozzle shall have a minimum spacing equal to 12 bar diameters and the remaining curtain shall have a minimum spacing of six bar diameters.

- B. Lap splices in reinforcing bars shall be by the non-contact lap splice method with at least 2 inches clearance between bars. The enforcement agency may permit the use of contact lap splices when necessary for the support of the reinforcing provided it can be demonstrated by means of preconstruction testing, that adequate encasement of the bars at the splice can be achieved, and provided that the splices are placed so that a line through the center of the two spliced bars is perpendicular to the surface of the shotcrete work.

3.05 CAST-IN-PLACE CONCRETE

A. Conveying and Placing Concrete:

1. Before placing concrete, mixing and conveying equipment shall be well cleaned, and the forms and space to be occupied by concrete shall be thoroughly cleaned and wetted. Ground water shall be removed until the completion of the work.
2. No concrete shall be placed in any unit of work until all formwork has been completely constructed, all reinforcement has been secured in place, all items to be built into concrete are in place, and form ties at construction joints tightened.
3. Concrete shall be conveyed from mixer to place of final deposit in such a way to prevent the separation or loss of ingredients. It shall be placed as nearly as practicable in its' final position to avoid rehandling or flowing. Concrete shall not be dropped freely where reinforcing bars will cause segregation, nor shall it be dropped freely more than six (6) feet. Use tremies, spouts and dump boxes in deep sections. Vibrators are not acceptable for facilitating concrete transport.
4. Concrete shall be tamped and spaded to insure proper compaction into all parts of forms and around reinforcement. A mechanical vibrator shall be used to thoroughly compact the concrete. Vibration must be by direct action in the concrete and not against forms or reinforcement.
5. Mixing and transport time as indicated in ASTM C94 is required. If air temperatures are between 85° and 90° F the delivery time is to be reduced to 75 minutes. When air temperatures is in excess of 90° F the delivery time should be reduced to 60 minutes.
6. Truck mixes without batch certificates will be rejected.

- B. Construction Joints / Expansion Joints: Construction joints and expansion joints shall be provided at locations and in the manner shown on the Drawings. With exception of existing concrete / new shotcrete joints, use PVC bulb-type waterstops appropriate for design condition between all concrete pours / lifts to avoid cold joints. Waterstops shall be placed in such a way to protect reinforcing steel from rust and oxidation. All expansion joints must be the full depth of the concrete section in which they are located.
- C. Slab Finishes: Concrete slabs shall be compacted and screeded uniformly to grades shown. Push large aggregates below the surface with a screen tamper, screed and bull float. As soon as the surface becomes workable, it shall be wood floated, then finished as indicated on the Drawings to a uniform smooth, true surface in a neat and workmanlike manner. Carefully coordinate slab finish requirements with other trades (ceramic tile, pool plaster) to insure concrete finish is appropriate substrate for final finish material.
1. Contractor shall provide three mock-up deck samples, minimum 3'x 3', with a wedge anchor installed in one sample. These (3) samples shall be constructed; one with a light broom finish, one (1) with a medium broom finish and one (1) with a heavy broom finish for determination and selection of an appropriate deck finish. Each sample shall be edged on all four sides to demonstrate a 3/4" radius edge. Anchor installation shall demonstrate acceptable interface between anchor and the top of deck. Deck samples shall remain on job site through final inspection for reference.
 2. Pool Floor Slab: Heavy Wire Broom Finish.
- D. Protection and Curing:
1. Concrete shall be protected from injurious action of the elements and defacement of any nature during construction.
 2. All forms must be kept wet to prevent drying out of the concrete.
 3. All concrete surfaces including footings must be kept wet for at least seven (7) days after concrete is placed.
 4. Apply the appropriate curing materials, as specified in 2.03 of this Section, immediately after finishing slabs. Application shall be as specified by the manufacturer.
- E. Form Removal:
1. Take care in removing forms so that surfaces are not marred or gouged and that corners are true, sharp and unbroken.
 2. No steel spreaders, ties or other metal shall project from or be visible on any concrete surfaces.
- F. Defective Work:

1. Should the strength of any concrete for any portion of the work indicated by tests of molded cylinders and core tests fall below minimum 28 days strength specified or indicated, concrete will be deemed defective work and shall be replaced.
2. Concrete work that is not formed as indicated, is not true to intended alignment, not plumb or level where so intended, not true to intended grades or elevations, not true to specified or selected finish, contains sawdust shavings, wood, or embedded debris, which exhibits cracks or contains fine or coarse sulfide particles, or expansive aggregates detrimental to performance or appearance of the concrete shall be deemed defective.
3. Promptly perform work required to replace and properly clean (by sandblasting if necessary) any defective concrete panels (control joint or expansion joint to control joint or expansion joint), at Contractor's expense, including all expense of additional inspection, tests, or supervision made necessary as a result of defective concrete.

3.06 EXPANSION JOINTS

- A. Temperatures: Do not install sealants when air temperature is less than 40°F.
- B. Tooling: Tool exposed joints to a slightly concave surface using slicking materials recommended by the manufacturer. The tooling procedure shall press sealant against the sides of the joint. No materials shall be left "feathered" out or smeared on the abutting materials. Completed joints shall have a uniform professional appearance.
- C. Joint Construction: Sealant joint width, thickness and cross-sectional profile to be constructed in strict accordance with the sealant manufacturer's recommendations.
- D. Sand: At the appropriate time cover the sealant with sand to provide a sanded finish.

3.07 CLEAN-UP

- A. Upon completion of the Work of this Section, immediately remove all swimming pool concrete materials, debris and rubbish occasioned by this Work to the approval of the Owner's Representative.

END OF SECTION

SECTION 13 11 03

SWIMMING POOL SHOTCRETE

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide labor, materials and equipment as required to install wet mix shotcrete for swimming pool structures as indicated on the Drawings and herein specified.

1.02 QUALITY ASSURANCE

- A. Qualifications of Workers:
 - 1. The entity performing the work of this Section shall have been successfully engaged in the respective trade prior to commencement of the Work.
 - 2. For actual construction operations, use only trained and experienced workers with experience with the materials and methods specified.
 - 3. Provide at least one person who shall be present at all times during execution of the work of this Section, with experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.

- B. Standards: Except as otherwise indicated, provide shotcrete per American Concrete Institute Standard ACI 506. In addition, conform to recommendations contained in "Shotcrete," Brochure G-84 as published by the Guniting Contractors Association, Sylmar, California and the California Building Code (latest edition).

- C. Mix Design: The Contractor shall submit a mix design stamped and signed by a licensed engineer for approval by the University's Representative prior to any placement of shotcrete. Mix design shall indicate source of aggregate and brands of cement and admixtures used. All mix designs shall take character of locally available aggregate into consideration and make adjustments as necessary to conform with specified design criteria.

- D. One test panel shall be provided for each 50 yards (or portion thereof) of shotcrete placed. The size of the strength test panel shall be per the direction of the Special Shotcrete Inspector. At least three (3) cores shall be taken from each test panel. (At least three (3) cores shall be taken from the completed work for each day of shotcrete operation.) Testing shall be performed by the Owner's designated Testing Lab and comply with 1705A.3 and 1910A.10, California Building Code. Continuous inspection of the shotcrete operation by a deputy inspector provided by the Owner shall be required. Inspection of shotcrete work shall comply with Section 1910A of

California Building Code, and coring, sampling, soaking and testing per 1910A.10 and pre-construction test per 1910A.5 is required.

- E. Tolerances: Construct all swimming pool shotcrete straight, true, plumb and square within a tolerance horizontally of one in 200 and a tolerance vertically of one in 2000.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. Provide submittals in conformance with the requirements of The "Whitebook".
- B. Materials List: Within thirty (30) days after issuance of Notice to Proceed, and before shotcrete materials are delivered to the project site, submit to the Owner a complete list of materials proposed to be used in this portion of the Work, showing manufacturer's name and catalog number of all items such as admixtures and curing membranes, and the name and address of the supplier of cement and aggregate to be used.
- C. Submit proof of qualifications as specified in Article 1.02.A of this Section.

1.04 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect shotcrete materials before, during and after installation and to protect the installed Work specified in other Sections.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner and at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cement: Cement shall be Type 1 Portland Cement conforming to ASTM C150. Cement type shall be the same for all shotcrete work.
- B. Aggregate: ASTM C33, washed hard dense durable clean sharp sand from approved pit, free of organic matter and opaline, feldspar, or silicious magnesium substances and containing not more than 3% by weight of deleterious substances. When tested for organic impurities by ASTM C40 method, fine aggregate color not darker than reference standard color. When tested for soundness by ASTM C88 method, loss after 5 cycles not over 10% of fine aggregate.
- C. Water: Potable, clean, fresh, free from acid, alkali, organic matter or other impurities liable to be detrimental to the shotcrete.

- D. Admixtures: Admixtures shall only be used upon approval of the Owner's Representative.

PART 3 EXECUTION

3.01 EXECUTION

- A. Inspection:
 - 1. Prior to all Work of this Section carefully inspect the installed Work of other trades and verify that all such Work is complete to the point where this installation may properly commence.
 - 2. Verify that items to be imbedded in shotcrete are in place and that shotcrete may be placed to the lines and elevations shown on the Drawings, with all required clearance from reinforcement.
- B. Discrepancies:
 - 1. In the event of discrepancy, immediately notify the Owner's Representative.
 - 2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
 - 3. Failure to notify the Owner's Representative and give written notice of discrepancies shall constitute acceptance by the Contractor of existing conditions as fit and proper to receive the Work.

3.02 PREPARATION

- A. General:
 - 1. Thoroughly clean all areas where shotcrete is to be placed to insure proper bonding of shotcrete.
 - 2. Where shotcrete is to be placed against smooth surfaces (i.e., cast-in-place concrete), sandblast surfaces to receive shotcrete to provide clean aggregate surface, thereby insuring proper bond between materials.
- B. Ground Wires: Adequate ground wires, to be used as screeds, shall be installed to establish the thickness and surface planes of the shotcrete work. Ground wires shall be placed so that they are tight and true to line and grade and in such a manner that they can be easily tightened.

3.03 PROPORTIONING AND MIXING

- A. Accurately control proportion of water to Portland cement to produce thorough and uniform hydration of the shotcrete that, when shot, forms a homogeneous mass containing neither sags nor dry sand formation.
- B. Strength: Minimum 3,000 psi 28-day compressive strength unless otherwise indicated.
- C. Discontinue shotcrete work if the time between the addition of mixing water to cement and aggregate, or cement to aggregates, and placement of shotcrete exceeds ninety (90) minutes when the ambient temperature is below 85 degrees Fahrenheit, or exceeds sixty (60) minutes when the ambient temperature is above 85 degrees Fahrenheit.

3.04 SHOTCRETE PLACING, FINISHING, AND CURING

- A. Operations: Utilize a standard type of air compressor, capable of providing a minimum of 250 cubic feet of air per minute per nozzle.
- B. Placing: Except when shooting reinforcing, hold the nozzle perpendicular to and 2-1/2 to 3 feet from surface. At reinforcing bars, hold the nozzle so as to direct shotcrete behind the bars, and shoot each side of each bars separately. A nozzleman's helper equipped with an air jet shall precede the nozzle and blow out rebound or sand lodged behind bars, on forms, or placed shotcrete. Placing shotcrete horizontal members from the top is not allowed unless approved methods are employed to eliminate all rebound. Material shall emerge from the nozzle in a uniform flow. If flow becomes intermittent for any reason, direct the nozzle away from the surface until the flow is again steady and constant. Do not reuse rebound or loose sand for any purpose.
- C. Puddled Shotcrete: Use of "puddled shotcrete" in which the air pressure is reduced and the water content is increased to facilitate placing in difficult locations is not allowed. Do not place shotcrete where nozzle stream cannot impinge directly on the involved surface. Where difficult shooting conditions occur, obtain proper results by maintaining correct air pressure and water ratio and reduce supply of material.
- D. Construction Joints: Form joints with sloping beveled edges. Clean and dampen the hardened joint surfaces before placing additional shotcrete. Square edged construction joints are not allowed. The film of laitance which forms on the surface of the shotcrete shall be removed within approximately two hours after application by brushing with a stiff broom. If this film is not removed within two hours, it shall be removed by thorough wire brushing or sand blasting. Construction joints over eight hours old shall be thoroughly cleaned with air and water prior to receiving shotcrete.
- E. Finishing: Rod exposed surfaces to true planes and lines on reaching the thickness and plane established by forms and ground wires. Tamp and wood float surfaces level and provide a rough raked finish. Carefully coordinate finish requirements with other trades (ceramic tile, pool plaster) to insure shotcrete finish is appropriate substrate for final finish material.

- F. Curing: Keep shotcrete continuously damp for not less than seven (7) days after placing. Use sealed curing sheeting or other approved curing method where water curing is not feasible. Do not use curing compound of any kind.

3.05 DEFECTIVE WORK

- A. Cut out, remove and replace, or repair to the satisfaction of the Owner's Representative, shotcrete not meeting minimum strength, not true, plumb or level, not to required elevations, containing cracks detrimental to performance or appearance, containing shavings, debris or with honeycombs or voids.
- B. Promptly perform Work required to repair, patch, replace, render properly cleaned surfaces (by sandblasting if necessary) or otherwise make good any defective shotcrete at Contractor's expense, including all expense of additional inspection, tests, or supervision made necessary as a result of defective shotcrete.

3.06 CLEAN-UP

- A. Upon completion of the Work of this Section, immediately remove all swimming pool shotcrete materials, debris and rubbish occasioned by this work to the approval of the Owner's Representative.

END OF SECTION

SECTION 13 11 04
SWIMMING POOL CERAMIC TILE

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnish and install all swimming pool ceramic tile detailed on the Drawings, including, but not limited to, the following:
1. Bond Beam / Waterline Tile. (Rim Flow Pool)
 2. Gutter Bullnose Tile. (Rim Flow Pool)
 3. Lane Line / Target Tile / Depth Tiles.
 4. Depth Marker Tile. (At Cantilever Deck)
 5. Depth / Caution Marker Tile. (At Pool Deck / Bond Beam)
 6. Trim Tile. (At Underwater Steps)
 7. Replace pool tile (In all locations where demolition was required for new piping)

1.02 QUALITY ASSURANCE

- A. Qualifications of Workers:
1. The entity performing the work of this Section shall have been successfully engaged in the respective trade prior to commencement of the Work.
 2. For actual construction operations, use only trained and experienced workers with experience with the materials and methods specified.
 3. Provide at least one person who shall be present at all times during execution of the work of this Section, with experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.
- B. Standards: In addition to complying with all pertinent codes and regulations:
1. Manufacture of all tile shall be in accordance with ANSI A-137.1-1976.
 2. Install ceramic tile in accordance with the recommendations contained in the 2017 "Handbook for Ceramic Tile Installation" of the Tile Council of America, Inc.

- C. Tolerances: Install all swimming pool ceramic tile straight, true, plumb and square within a tolerance horizontally of one in 200 and a tolerance vertically of one in 500. Waterline and gutter bullnose tile shall be level to 1/8" (+/- 1/16") around entire perimeter of swimming pools.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. Provide submittals in conformance with the requirements of The "Whitebook".
- B. Samples: Submit samples of each color and pattern in the specified groups. Character samples can be representative for review prior to screening of actual tile.
- C. Master Grade Certificate: Prior to opening ceramic tile containers, submit a Master Grade Certificate, signed by the manufacturer of the tile used and issued when the shipment is made, stating the grade, kind of tile, identification marks for the tile containers, and the name and location of the Project.
- D. Specifications: Submit manufacturer's recommended installation specifications for the Work.
- E. Submit proof of qualifications as specified in Article 1.02.A of this Section.

1.04 PRODUCT HANDLING

- A. Delivery: Deliver all materials to the Project Site in the manufacturer's original unopened containers with all labels intact and legible.
- B. Storage: Store all materials under cover in a manner to prevent damage and contamination, and store only the specified materials at the Project site.
- C. Protection: Use all means necessary to protect swimming pool ceramic tile before, during and after installation and to protect the installed Work specified in other Sections.

- D. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner.

PART 6 -

PART 7 - PART 2 - PRODUCTS

2.01 TILE

A. Bond Beam / Waterline Tile (Rim Flow Pool):

1. Material: Group 4 quality, frost proof unglazed ceramic mosaic tile with absorption rate of less than 1% as manufactured by Dal-Tile or approved equal.
2. Size: 1 x 1 inches.
3. Color: Dal-Tile #D-353, 'Iris'.

B. Gutter Bullnose Tile (Rim Flow Pool):

1. Material: Group 4 quality, frost proof unglazed ceramic mosaic tile with absorption rate of less than 1% as manufactured by Dal-Tile or approved equal.
2. Size: 1 x 2 inches (#C-701).
3. Color: Dal-Tile #D-353, 'Iris'.

C. Lane Line / Target Tile:

1. Material: Group 3 quality, frost proof unglazed ceramic mosaic tile with absorption rate of less than 1% as manufactured by Dal-Tile or approved equal.
2. Size: 1 x 1 inches Hex
3. *Color: Dal-Tile #D311, 'Ebony' in 25 yard direction.

D. Depth / Caution Marker Tile (at Deep Gutter Pool Deck):

1. Material: Group 3 quality, frost proof unglazed ceramic mosaic tile with absorption rate of less than 1% as manufactured by Dal-Tile or approved equal.
2. Size: 1 x 1 inches.
3. Color: Dal-Tile #D-311, 'Ebony' letters and numbers on #D-014, 'Light Gray' field.

E. Trim Tile (On Underwater Steps and 4'-6" Depth):

1. Material: Group 3 quality, frost proof unglazed ceramic mosaic tile with absorption rate of less than 1% as manufactured by Dal-Tile or approved equal.

2. Size: 1 x 1 inches, with S-812 quarter round. Color: Dal-Tile #D-311, 'Ebony'.
3. Size: 2 x 6 inches with integral quarter round. Color: Black, non-slip. Inlays or equal.
4. Size at 4'-6" depth: 1 x 1 inches. Color: Dal-Tile #D311 'Ebony'

F. "No Diving" Tile (at pool deck):

1. Material: Frost proof unglazed non-slip ceramic mosaic tile with absorption rate of less than 1% as manufactured by Dal-Tile or approved equal.
2. Size: 6 x 6 inches.
3. Color: International "No Diving" symbol over white background. Inlays #C621500, 'White' field.

G. Pool Interior Tile: (re-tiling all areas where the pool was demolished for renovation)

1. Material: Group 3 quality, frost proof unglazed ceramic mosaic tile with absorption rate of less than 1% as manufactured by Dal-Tile or approved equal.
2. Size: 1 x 1 inches Hex at Pool Floor, 1 x 1 Square at Pool Wall
Color: Dal-Tile #D617, 'Artic White'.

2.02 MORTAR

- A. Sand for Mortar: Comply with requirements of fine aggregate for concrete.
- B. Cement: Type I Portland Cement, conforming to ASTM C150.
- C. Hydrated Lime: Conforming to ASTM C206 or 207, Type S.
- D. Water: From a potable source.
- E. Mortar shall meet ASTM C270 standards.

2.03 THIN SET MORTAR

- A. Laticrete 254 Platinum. Laticrete, Custom or equal.
- B. Water from a potable source.
- C. Mortar shall meet ASTM C627.

2.04 GROUT

- A. All tile grout shall be waterproof grout complying with the recommendations of referenced standards. Grout color shall be grey for dark backgrounds, white for light backgrounds (verify colors with Architect).

2.05 OTHER MATERIALS

- A. All other materials, not specifically described but required for a complete and proper installation of ceramic tile as indicated on the Drawings, shall be new, first quality of their respective kinds, and subject to the approval of the Owner's Representative.

2.06 GUTTER, PUMP PIT, BACKWASH PIT & SURGE CHAMBER WATERPROOFING

- A. Xypex, Miracote Miraflex Membrane C Hycrete Waterproofing System concrete additive or approved equal. Mix and apply per manufacturer's recommendations for specific application. Color shall be Gray.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection:
 - 1. Prior to all Work of this Section, carefully inspect the installed Work of other trades and verify that all such Work is complete to the point where this installation may properly commence.
 - 2. Verify that ceramic tile can be installed in accordance with the original design and all referenced standards.

B. Discrepancies:

1. In the event of discrepancy, immediately notify the Owner's Representative.
2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
3. Failure to notify the Owner's Representative and give written notice of discrepancies shall constitute acceptance by the Contractor of existing conditions as fit and proper to receive its Work.

3.02 INSTALLATION

A. Method:

1. Install all ceramic tile in strict accordance with installation method P601-90 of the 2017 Handbook for Ceramic Tile Installation of the Tile Council of America, Inc.
2. Be certain to install all ceramic tile perfectly level, flush, plumb, and to the finish grades and elevations indicated on the Drawings.

B. Interface:

1. Carefully establish and follow the required horizontal and vertical elevations to insure proper and adequate space for the work and materials of other trades.
2. Coordinate and cooperate as required with other trades to insure proper and adequate interface of ceramic tile Work with the Work of other trades.

3.03 GROUTING

- A. Follow grout manufacturer's recommendations as to grouting procedures and precautions.

- B. Remove all grout haze, observing grout manufacturer's recommendations as to use of acid and chemical cleaners.

3.04 EXTRA STOCK

- A. Provide one (1) unopened box of extra tile for 2.1A, 2.1B, 2.1C and 2.1F for Owners use at a future time.

3.05 CLEAN-UP

- A. Upon completion of the swimming pool ceramic tile installation, thoroughly clean and polish the exposed surfaces of tile work. Completely clean work area of debris and rubbish occasioned by this Work and dispose of to the approval of the Owner's Representative.

END OF SECTION

SECTION 13 11 06
SWIMMING POOL EQUIPMENT

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Swimming pool equipment items required for this Work as indicated on the Drawings and specified herein.

1.02 QUALITY ASSURANCE

- A. Qualifications of Workers:
 - 1. The entity performing the work of this Section shall have been successfully engaged in the respective trade prior to commencement of the Work.
 - 2. For actual construction operations, use only trained and experienced workers with experience with the materials and methods specified.
 - 3. Provide at least one person who shall be present at all times during execution of the work of this Section, with experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.

- B. All equipment supplied or work performed shall comply with regulations governing public swimming pools and spas as contained within Chapter 31 of California Building Code, latest edition.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. Provide submittals in conformance with the requirements of The "Whitebook".

- B. Required submittals include:
 - 1. Swimming Pool Fittings as specified in Article 2.01 of this Section.
 - 2. Swimming Pool Deck and Mechanical Equipment as specified in Article 2.02 of this Section.

- C. Submit proof of qualifications as specified in Article 1.02.A of this Section.

- D. The equipment shown on the plans represent the first listed items in the technical specifications. The Contractor shall be responsible for all required field coordination and installation of any approved equal product to provide a fully working and warranted system. The Contractor shall submit detailed shop drawings for any products used other than the first listed specified items. Contractor provided shop drawings shall include details and quality equal to the original plans and construction documents. The Contractor shall provide any and all required engineering including but not limited to structural and anchorage requirements for any proposed equipment other than the first listed specified equipment. The Contractor is responsible to provide a factory certified representative(s) to start-up and provide on-site training for all swimming pool mechanical equipment provided.

1.04 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect swimming pool equipment items before, during and after installation and to protect the installed work specified in other Sections.

- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner's Representative.

PART 2 - PART 2 PRODUCTS

2.01 SAFETY EQUIPMENT

NA

2.02 MAINTENANCE EQUIPMENT

NA

2.03 FITTINGS

- A. Gutter Outlet Frame & Grate (12"x12"): Lawson Aquatics #MLD-FGD-1212, or approved equal. eight (8) required.

- B. Floor Return Inlet 1-1/2" Adjustable: StaRite #08417-0000, United Industries, or approved equal. Forty three (43) required.

2.04 DECK EQUIPMENT

- A. Figure 4 Grab Rails, Set of 2: KDI-Paragon #30102, 1.90" O.D. x .109" wall, no known equal. Two (2) sets required.
- B. Recessed Steps, Set of 3: SR Smith #62-209-4001, KDI-Paragon #32102. Two (2) sets of three required.
- C. Handrail: Stainless Steel, Custom Bend, 1.90" O.D. x .065" wall. Three (3) required.
- D. Anchor Sockets for Grab Rails, Hand Rails & Ladders: KDI-Paragon 28102, no known equal. Fourteen (14) required.
- E. Stainless steel Escutcheon Plates for Grab Rails, Hand Rails & Ladders: Spectrum Model #35214, no known equal. Fourteen (14) required.
- F. Lane Line Anchors: Heavy eye bolt with insert. KDI-Paragon #70317/18, no known equal. Forty-six (42) required.
- G. Disabled Lift: Self-operable with 350 lb. lifting capacity and 12" water draft; with headrest, dual flip-up armrests, pull-out leg rest, submergible push-button remote control, lockable cover, transport cart, extra battery, wall mount charger and 5-year manufacturer warranty (contractor to confirm unit meets appropriate local government agency ADA requirements); furnish with deck anchors. Aqua Creek model #F-PPXRD or approved equal. One (1) required.

2.05 CIRCULATION PUMP STRAINER

- A. Existing pump to remain and be moved to new location.

2.06 CIRCULATION PUMP

- A. Existing pump to remain and be moved to new location.

2.07 FILTRATION SYSTEM

- A. Existing Filtration System to remain

2.08 POOL HEATER

- A. Existing Pool Heater to remain

- B. Existing Steam Boiler to be removed and replaced with a back-up heater; Raypak Hi Delta #2002C; 1,999,000 BTUH natural gas heater; electronic ignition with California Control package; furnish complete with stack top as required. 21/2" water influ/efflu connections, 2" natural gas connection and 14" diameter flue to atmosphere. One (1) required.

2.09 CHLORINE FEED/STORAGE

- A. Existing to remain

2.10 ACID STORAGE/ FEED SYSTEM

- A. Existing to remain

2.11 SWIMMING/ACTIVITY POOL WATER CHEMISTRY CONTROLLERS

- A. Existing to remain

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection:
 1. Prior to installing the items of this Section, carefully inspect the installed Work of other trades and verify that all such Work is complete to the point where this installation may properly commence.
 2. Verify that the swimming pool equipment items may be installed in strict accordance with original design, pertinent codes and regulations, and the manufacturers' recommendations.

- B. Discrepancies:

1. In the event of discrepancy, immediately notify the Owner's Representative's Representative.
2. Do not proceed with installation in areas of discrepancy until all such discrepancies are fully resolved.
3. Failure to notify the Owner's Representative's Representative and give written notice of discrepancies shall constitute acceptance by the Installer of existing conditions as fit and proper to receive its Work.

3.02 INSTALLATION

- A. Supply and install items of swimming pool equipment in strict accordance with applicable codes and regulations, the original design, and the manufacturer's published recommendations, anchoring firmly and securely for long life under hard use.
- B. Coordinate with other trades to insure all imbedded items are set plumb and flush. Railing ends must have anchor sockets and escutcheon plates. Be certain that deck equipment and railings are properly bonded prior to imbedding.
- C. All equipment shall be braced and/or anchored to resist a horizontal force acting in any direction using the criteria shown on the Drawings.

3.03 INSTRUCTION

- A. The Contractor shall provide a factory certified representative(s) to start-up and certify proper installation, operation and full warranty status of all swimming pool mechanical equipment. The Contractor shall provide not less than two 8-hour days of on-site training for facility staff in the operation and maintenance of the swimming pool mechanical equipment and systems. The two 8-hour days shall be separated by a minimum of seven calendar days and be completed within the 14-day start-up period.

3.04 EQUIPMENT ACTIVATION

- A. All water chemistry and filtration mechanical equipment shall be operational upon filling of pool after plaster. Chemicals and other related support items as supplied by Contractor, shall be in supply at start-up.
- B. For the first fourteen (14) calendar days after completion of the pool plaster, brush all plastered surfaces at least twice a day and coordinate with General Contractor to

ensure that the plaster is carefully maintained after the initial fourteen day period. In addition, coordinate with the Contractor to ensure that pool filtration equipment is continuously running during the initial fourteen day period.

- C. Start-up and provide qualified personnel to operate pool equipment for a period not less than fourteen (14) days after the pool is placed in operation, or until the Owner takes occupancy of the facility or letter of substantial completion. During this time, Contractor shall instruct and supervise the Owner's personnel in the various operating and maintenance techniques involved. Contractor shall be responsible for supply of chemicals during this not less than fourteen (14) day period and at time of turnover to Owner, chemical storage tanks shall be full. (Owner's personnel shall be fully trained and capable of assuming swimming pool maintenance tasks, training may begin before Owner takes occupancy).

3.05 CLEAN-UP

- A. Upon completion of swimming pool equipment, remove all debris, materials and equipment occasioned by this Work to the approval of the Owner's Representative's Representative.

END OF SECTION

SECTION 13 11 07

SWIMMING POOL MECHANICAL

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Swimming pool mechanical piping as indicated on the Drawings for circulation and filtration systems, pool water heating systems, chemical control systems, booster pump systems and appurtenances.
- B. Domestic water system from points of connection within swimming pool mechanical equipment room to make-up water system.
- C. Filter backwash piping to point of connection with backwash retention pit as required.

1.02 QUALITY ASSURANCE

- A. Qualifications of Workers:
 - 1. The entity performing the work of this Section shall have been successfully engaged in the respective trade prior to commencement of the Work.
 - 2. For actual construction operations, use only trained and experienced workers with experience with the materials and methods specified.
 - 3. Provide at least one person who shall be present at all times during execution of the work of this Section, with experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.
- B. Standards:
 - 1. All equipment supplied or work performed shall comply with Chapter 31 of California Building Code, latest edition.
 - 2. Work shall be performed in accordance with the applicable editions of all National, State and local codes, laws, regulations and ordinances, including the following:

- a. American National Standards Institute (ANSI).
 - b. American Society for Testing Materials (ASTM).
 - c. American Waterworks Association (AWWA).
 - d. American Welding Society (AWS).
3. Do not construe anything in the Drawings or Specifications to permit Work not conforming to these requirements.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. Provide submittals in conformance with the requirements of The “Whitebook”.
- B. Required submittals include:
 1. Pipe and Fittings as specified in Article 2.02 of this Section.
 2. Valves as specified in Article 2.03 of this Section.
 3. Pressure / Vacuum Gauges as specified in Article 2.04 of this Section.
 4. Pipe Hangers and Supports as specified in Article 2.05 of this Section.
 5. Sleeves and Waterstops as specified in Article 2.06 of this Section.
- C. Submit proof of qualifications as specified in Article 1.02.A of this Section.

1.04 PRODUCT HANDLING

- A. Delivery: Deliver all materials to the Project Site in the manufacturer’s original unopened containers with all labels intact and legible.
- B. Storage: Store all materials under cover in a manner to prevent damage and contamination, and store only the specified materials at the Project site.
- C. Protection: Use all means necessary to protect swimming pool mechanical items before, during and after installation and to protect the installed Work specified in other Sections.

- D. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner and at no additional cost to the Owner.

1.05 JOB CONDITIONS

- A. Cooperate with entities performing Work specified in other Sections to so that no conflict of new construction or occupied space may occur. Should any installation Work be done without such craft coordination, that Work so installed shall be removed and re-installed.

PART 2 PRODUCTS

2.01 PRODUCT QUALITY

- A. Materials and equipment shall be new, of the best quality for the purpose intended, and shall be clearly marked with the manufacturer's name and nameplate data or stamp and rating. As far as practicable, materials and equipment shall be of one manufacturer.

2.02 PIPE AND FITTINGS

- A. PVC Schedule 40: Type 1, normal impact, NSF approved for solvent welding applications, ASTM Specification D-1785, color shall be white. Dura, Lasco, or approved equal.
- B. PVC Schedule 80: Type 1, normal impact, NSF approved for solvent welding applications, ASTM Specification D-1785, color shall be gray. Dura, Lasco, or approved equal.
- C. CPVC Schedule 80 Influent/Effluent Heater Piping: Type 1, normal impact, NSF approved for solvent welding applications, ASTM Specification D-1785, color shall be gray. Dura, or Lasco.
- D. PVC DR25: Conforming to ATSM D-1784, use with epoxy coated bell and spigot-type fittings or epoxy coated mechanical joint by flange adapters with epoxy coated cast iron fittings as specified in Article 2.02 (F), below. Johns-Manville "Big Blue", Diamond Plastics, or approved equal.

- E. Copper Tubing: ASTM Specification B-88, hard drawn, with ANSI Standard B16.22 wrought copper fittings.
- F. Steel: ASTM Specification A-120, Schedule 40 black or galvanized pipe with ASTM A-47 150 lb. banded malleable iron threaded fittings.
- G. Cast Iron: ASTM Specification B16.1, cast iron flanged fittings, provide epoxy coating as required for use with chlorinated water.

2.03 VALVES

A. Ball Valves:

1. For pool system: True-Union design, PTFE seat material with FPM or FKM Double O-ring stem seals, locking handle, NSF certified. PVC schedule 80 body for below grade installation. PVC Schedule 80 body for above grade installation. Furnish ball valves on all pipe diameters 2 ½" or less with a rating of at least 200psi at 73° F, Asahi, Ipex or Nibco.
2. For copper pipe system: 3-piece full-port Bronze body valve with Teflon seat, 'Apollo', 'Nibco' or approved equal.

B. Butterfly Valves:

1. Epoxy coated cast or ductile iron body, 316 stainless steel disc and stem, viton seat material, furnish hand wheel/gear operators on all valves 8" and larger. DeZurick, Keystone, Ipex or equal.
2. PVC body, PVC disc and EPDM construction suitable for chlorinated water applications. Stem shall be of 316 stainless steel and non-wetted. Valves shall be self-gasketed design with a convex sealing arrangement. Valves 1-1/2" – 10" shall be rated to 150 psi and 12" valves shall be rated to 100 psi at 70°F. Asahi Pool-Pro, no known equal.

- C. Check Valves: Wafer-type, epoxy coated cast or ductile iron body, 316 stainless steel plates and shaft, viton seat material. Centerline, Metraflex, or approved equal.
- D. Surge Chamber Float Valve: EPD #2-0020-019 Float Control Valve, line size, as manufactured by Environmental Products Division of Doughboy Recreational, Rancho Cucamonga, CA, no known equal.
- E. Surge Chamber Isolation Valve: Butterfly valve, tapped lug style, bronze body, stainless steel stem, bronze disc, phenolic back-up ring, EPT seat material. Provide stainless steel shaft extension, shaft housing and tool operator located 2'-0" above floor level with deck access grate as required. DeZurick, Keystone, Asahi, Spears, Iplex or approved equal.
- F. RP Backflow Preventer: Febco #835-B for 2" and smaller; #825 for 2-1/2" and larger. Febco, Watts, or approved equal.
- G. Make-up Water Control: Cla-Val make-up water control valve with ductile iron body/cover, bronze trim, globe pattern, Buna-N rubber seals. Pilot system materials to consist of bronze/brass with stainless steel wetted parts and Buna-N rubber seals.

System to include: 100-01 Hytrol valve, CF1-C1KX float control, X46A flow clean strainers, and copper tubing with brass fittings. Float linkage and float rod shall be PVC and brass. Base plate shall be 316 stainless steel. The plastic float shall be provided with 8' PVC rod and stops and a brass counter weight. Provide model #124-01AKX available KSI (714) 754-044.

2.04 PRESSURE / VACUUM GAUGES

- A. Furnish and install pressure and vacuum gauges on the discharge and suction sides of all pumps. 2" or 2 1/2" diameter dial, bottom connection, chrome ring, shut-off cock and snubber. Ranges shall be selected to indicate between mid-point and two-thirds of maximum range under design conditions. Marsh, Trerice, or approved equal.

2.05 PIPE HANGERS AND SUPPORTS

- A. General:

1. The requirements of this Section relates to various requirements of the Agreement, General and Supplementary Conditions, Specifications, Drawings, and modifying documents which are part of the Construction Contract. Responsibility for coordination of all such applicable requirements will be that of the Contractor.

B. Description:

1. This section provides guidelines and limitations for the support of all mechanical, electrical, plumbing or architectural items from the building structure, and for the seismic bracing of such items.
2. Design and install all support and bracing systems as required for the swimming pool systems. Provide for attachment to portions of the building structure capable of bearing the loads imposed. Design these systems to not overstress the building structure.

C. Quality Assurance:

1. Design and install all support systems to comply with the requirements of the 2016 California Building Code, Chapter 16A.
2. Seismic bracing is to be designed by a professional engineer licensed in the State of California.
3. For the seismic bracing of mechanical, electrical and plumbing system, refer to "Guidelines for Seismic Restraints of Mechanical Systems and Plumbing Piping Systems" by Sheet Metal and Air conditioning Contractors National Association, Inc., (SMACNA) for guidelines.

D. Submittals:

1. Submit shop drawings for all substructures and attachment methods.
2. Submit proposed alternative methods of attachment for review and approval by the Architects, prior to deviating from the requirements given below.
3. For all pipe hangers and support systems, submit structural calculations and details which include all resultant forces applied to the building structure and are prepared and signed by the Contractor's licensed California professional engineer. Calculations will be reviewed for compliance with design criteria, not for arithmetic.

E. Materials:

1. Use Kin-Line, Grinnel, or approved equal.
2. Support all pipelines individually with hangers, each branch having at least one hanger. Lateral brace as noted and required.
3. Support piping near floor with steel stanchions welded to end plates secured to pipe and floor.
4. Support vertical piping at each floor level. Install coupling in piping at each support. Coupling shall rest on and transmit load to support. Isolate copper from steel supports with vinyl electrician's tape around pipe and coupling.
5. Use Stoneman "Trisolator," Unistrut, or approved equal, isolators at each hanger and other support points on bare copper tubing system.
6. For PVC pipe, space hangers four (4) feet apart for pipe sizes 1" and under, five (5) feet apart for pipe sizes 1-1/4" to 2", and six (6) feet apart for pipe sizes over 2". Space hangers for horizontal pipes at a maximum of six (6) feet for copper 2" and smaller and for steel 1-1/4" and smaller; ten (10) feet for copper 2-1/2" and larger and for steel 1-1/2" and larger.
7. Size hanger rods, screws, bolts, nuts, etc., according to manufacturer's sizing charts.
8. Trapeze hangers may be used for parallel lines.
9. Use galvanized or cadmium plated hangers, attachments, rods, nuts, bolts, and other accessories in pool mechanical room, high humidity areas, or where exposed to weather. Hot dip galvanize all items which are not factory furnished. Plating for hinged movements must be done at the factory.
10. Lateral Bracing: To prevent swaying of the piping systems, provide angle iron bracing and anchor into wall or overhead framing. Piping shall be braced or anchored in such a way as to resist a horizontal force of 50% of its operating weight in any direction.
11. Do not use wire or other makeshift devices for hangers.
12. Furnish all substructures and fasteners required to comply with the limitations given below. Use material as specified in the various sections and as appropriate to their use.

F. Guidelines & Limitations:

1. Each Contractor will coordinate the load requirements from all subcontractors so that no combination of loads overstresses the building structure or exceed the limitations given below.

2. Concrete Structure:
 - a. Support all loads hung from concrete structure with cast-in-place inserts, unless drilled-in anchors are specifically approved in writing prior to placing the concrete.
 - b. Concrete anchors must not penetrate into reinforcing bars. Where the anchors boring indicates the presence of reinforcing bar, patch hole with an epoxy type grout and relocate anchor 12 diameters away.
 - c. Individual expansion anchors cannot support any loads greater than 300 pounds or manufacturer's specified load capacity without approval.

3. Steel Structure:
 - a. Hang no more than 20 pounds per metal deck rib in any span.
 - b. At beams, hang all beam loads greater than 40 pounds concentric to beam, not off the flanges.
 - c. Attached no loads to the beams or girders greater than the following without specific approval from the architect;
 - i. Roof beams and girders: 300 pound point load or 600 pound total load for a single span.

G. Seismic Bracing:

1. Design and install seismic bracing to not ground out vibration and sound isolation systems.

2. All items of mechanical and electrical equipment 60" or more in height are to be seismically braced whether such bracing is shown or not.

2.06 SLEEVES AND WATERSTOPS

- A. Provide sleeves where work of this Section passes through fire rated partitions, floors and ceilings, concrete slabs or exterior of structure. Caulk clearance space using sealant appropriate for application in conformance with manufacturer's recommendations and Title 24 of California Code of Regulations. 3m, Dow Corning, or approved equal. In lieu of sleeves and caulking, "Link Seal" products may be used.

- B. Provide prefabricated waterstops as indicated on the Drawings at all pipe penetrations through structures containing stored water (i.e., swimming pools, balance/surge tanks, etc.) to insure leak-proof seals.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection:
 - 1. Prior to Work of this Section, carefully inspect the installed Work of other trades and verify that such work is complete to the point where this installation may properly commence.
 - 2. Verify that items of this Section may be installed in accordance with the original design and referenced standards.

- B. Discrepancies:
 - 1. In the event of discrepancy, immediately notify the Owner's Representative.
 - 2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
 - 3. Failure to notify the Owner's Representative and give written notice of discrepancies shall constitute acceptance by the Contractor of existing conditions as fit and proper to receive his work.

3.02 ABBREVIATIONS AND SYMBOLS

- A. Abbreviations and symbols on the Drawings are those most commonly used. Obtain clarification from the Owner's Representative on any questionable items before bid.

3.03 GENERAL PIPING REQUIREMENTS

- A. Size any section of pipe for which size is not indicated or any intermediate section erroneously shown undersized the same size as the largest pipe connecting to it. Sizes listed are nominal.
- B. Cut pipe accurately to job measurements and install without springing or forcing, true to line and grade, generally square with building and/or structures and adequately supported to prevent undue stress on pipe, fittings and accessories.
- C. Make changes of direction with manufactured fittings. Street ells, bushings, reducing flanges, close nipples or bending of pipe is not allowed.
- D. Use great care to install piping in accordance with best practice. Plastic pipe shall be "snaked" in trenches to allow for thermal expansion.
- E. All above grade, below grade and buried or imbedded PVC shall be installed using solvent weld fittings. Also, each and every fitting and pipe end shall be prepared with solvent primer. Fittings shall be joined individually and with enough time between assembly of adjacent joints to allow them to seal solidly. After joining, an even ring of primer must be visible around the entire fitting. If any fittings are installed without visible primer, the fitting shall be removed and discarded and piping recut, rechamfered and joint made up again using a new fitting. All procedures, methods and techniques used to make up solvent weld joints shall be in strict accordance with manufacturer's recommendations.
- F. Arrange pipe and hangers to allow for expansion, contraction and structural settlement. No pipe shall contact structure except penetrations as shown on the Drawings.

- G. Provide dielectric connections between copper and dissimilar metals. In copper systems, threaded piping including connections to equipment shall be brass pipe and fittings. Install dielectric connections in vertical sections of piping only.
- H. Run pipe full size through shut-off valves, balancing valves, etc. Change pipe size within three (3) pipe diameters of final connection to control valves, fixtures and other equipment.
- I. Provide unions or flanges at connections to equipment, on service side of valves and elsewhere as required to facilitate ease of maintenance.
- J. Locate equipment shut-off valves as close to equipment as possible maintaining easy valve access.
- K. Make all connections between domestic water systems and equipment or face piping with approved backflow prevention devices as required.
- L. All PVC pipe exposed to direct sunlight shall be painted with two coats of Exterior Acrylic Semi-gloss Paint, Sherwin Williams or equal. Color to be selected by the Architect. Prior to painting the PVC pipes, the exterior of all PVC pipes shall be wiped with Methyl Ethyl Ketone, or an approved equal, to remove the glaze from the pipes.
- M. The Main Drain pipe must run either level or uphill from the main drain sump, through the surge pit (if applicable) and then to the circulation pump.

3.04 TRENCH EXCAVATION AND BACKFILL

- A. Excavation:
 - 1. Excavate and backfill trenches as required for the Work of this Section. Conform to requirements of Section 13 11 01.
 - 2. The Contractor shall perform all excavation of every description and of whatever materials encountered, to the depths indicated on the Drawings or as necessary. The Contractor shall dispose of the excavated materials not required or suitable for backfill as directed, and shall perform such grading as may be necessary to prevent surface water from flowing into the trenches.

The Contractor shall provide adequate equipment for the removal of storm or subsurface waters, which may accumulate in the excavated areas.

B. Trenching:

1. Excavate trenches to lines and grades as indicated on the Drawings and with banks as nearly vertical as practicable.
2. Bottoms of trenches shall be accurately graded to provide uniform bearing on undisturbed soil for the entire length of each section of pipe.
3. The width of the trench at and below the top of the pipe shall be such that the clear space between the barrel of the pipe and the trench wall shall not exceed 8" on either side of the pipe. The width of trench above the top of pipe may be wider if necessary.
4. Over-depth excavations shall be filled with tamped sand to required grades.
5. Excavations of five (5) feet or more in depth shall be shored or supported in conformance with rules, and regulations of State and Federal Governments. Shoring shall be constructed, maintained and removed in a manner to prevent caving of the excavation walls or other load on the pipe.

C. Backfilling:

1. Material for backfilling of pipes shall be approved granular material less than two (2) inches in diameter obtained from the excavation. No material of a perishable, spongy or otherwise unsuitable nature shall be used as backfill.
2. Backfilling of pipe trenches shall commence immediately after installation and testing to preclude damage to the installed pipe. Backfill around pipe shall be carefully placed so as not to displace or damage the pipe, and shall be carried up symmetrically on each side of the pipe to one foot above the top of the pipe. The material shall be carefully compacted or consolidated before additional backfill is placed.
3. Backfill above an elevation of one foot above the top of pipe in conformance with requirements of Section 131101. Material for balance of backfill shall be approved granular material less than six (6) inches in diameter taken from the excavation.
4. Unless otherwise indicated on the Drawings, all pipe shall have a minimum of eighteen (18) inches of cover.

3.05 GENERAL EQUIPMENT REQUIREMENTS

- A. Position equipment to result in good appearance and easy access to all components for maintenance and repairs.
- B. Install piping, flues, breeching and ducts so that they do not interfere with equipment access.
- C. Install level, secure and out of moisture. Provide shims, anchors, support straps, angles, grouted bases, or other items as required to accomplish proper installation.
- D. All screws, nuts, bolts and washers shall be galvanized, cadmium plated or stainless steel. After fabrication, hot-dip galvanize unfinished ferrous items for outdoor, below grade or other use subject to moisture.
- E. Extend 1/2" Schedule 40 black steel pipe lubrication tubes from all hard to reach locations to front of equipment or to access points. Terminate with proper type of lubrication fitting.

3.06 VALVES AND STRAINERS

- A. If no shut-off is indicated, provide ball valves at inlet connections and balance valves at outlet connections to fixtures and equipment. Provide proper valve trim for service intended.
- B. Use no solder end valves unless noted otherwise; provide adapters in copper tubing systems.
- C. Locate valves with stems above horizontal plane of pipe. In general, locate valves within six (6) feet of floor, out from under equipment, in accessible locations with adequate clearance around hand wheels or levers for easy operation.
- D. Provide all valves, cocks and strainers, full pipe size unless indicated otherwise.

- E. Provide hand wheel operators on all valves 6" and larger, under 6" lever operators may be used.
- F. Provide tool operated valve with stainless steel shaft extension and 'on deck' tool operation for surge chamber butterfly isolation valve.

3.07 IDENTIFICATION OF PIPING

- A. Identify each valve by a numbered brass tag with hole and brass chain mounted on valve stem or handle. Tag to be a minimum of 1" in diameter and numbers at least 1/4" high stamped into tag. Valves and plumbing lines shall be labeled clearly with the source or destination descriptions.
- B. Install an identification chart in a plastic or glass framed enclosure, which schematically illustrates the proper operation of all piping systems and indicates number and location of all valves and control devices within the system.
- C. The direction of flow for the recirculation equipment shall be labeled clearly with directional symbols such as arrows on all piping in the equipment area. Where the recirculation equipment for more than one pool is located on site, the equipment shall be marked as to which pool the system serves.

3.08 TESTS

- A. Perform tests in presence of Owner's Representative with no pressure loss or noticeable leaks.
- B. Do not include valves and equipment in tests. Include connection to previously tested sections if systems are tested in sections.
- C. Perform tests as follows:

<u>System</u>	1.1 TEST PRESSURE	1.2 TEST MEDIUM	1.3 DURATION
Skimmer Lines and Lawson Main Drain sump lines	20psig	Water*	4 hours
Pool Piping	50 psig	Water*	4 hours
Pool Main Drains	30 psig	Water*	4 hours
Domestic Water	150 psig	Water*	4 hours

***Never test PVC pipe or fittings with air or other gases, always use water.**

3.09 PIPE MATERIAL APPLICATION

- A. PVC Schedule 40: Below grade swimming pool piping and domestic water piping up to 12" line size; use standard solvent weld fittings.
- B. PVC Schedule 80: Above grade swimming pool piping up to 12" line size; use solvent weld Schedule 80 or epoxy coated cast iron fittings.
- C. Type L Hard Copper: Above grade domestic water piping.
- D. CPVC Schedule 80; Pool Heater Piping.
- E. Schedule 40 Steel: Natural gas piping.

3.10 CUTTING AND DRILLING

- A. Cutting or drilling necessary for installation of Work of this Section shall be done only with approval of Owner's Representative.

3.11 CLOSING-IN OF UNINSPECTED WORK

- A. Do not cover or enclose Work before testing and inspection. Re-open Work prematurely closed and restore all Work damaged.

3.12 QUIETNESS

- A. Quietness is a requirement. Eliminate noise, other than that caused by specified equipment operating at optimum conditions, as directed by Owner's Representative.

3.13 FLUSHING OF LINES

- A. Flush or blow out pipes free from foreign substances before installing valves, stops or making final connections. Clean piping systems of dirt and dust prior to initial start-up.
- B. Just prior to plastering the pool, under the observations of the IOR, the pool mechanical system shall be flushed using the pool circulation pump. Circulate water through the mechanical system until the effluent water from the pool return heads runs clean.

3.14 CLEAN-UP

- A. After all Work has been tested and approved, the Swimming Pool Subcontractor shall thoroughly clean all parts of the equipment installations, including all pool pipe and fittings in the pool mechanical room. Exposed parts shall be cleaned of cement, plaster and other materials and all grease and oil spots removed with solvent.
- B. The Swimming Pool Subcontractor shall remove debris from the Project site. Cartons, boxes, packing crates and excess materials not used, occasioned by this work shall be disposed of to the satisfaction of the Owner's Representative.
- C. If the above requirements of clean up are not performed to the satisfaction of the Owner's Representative, the Owner reserves the right to order the work done, the cost of which shall be borne by the Swimming Pool Subcontractor.

PART 2 - END OF SECTION

SECTION 13 11 08

SWIMMING POOL ELECTRICAL

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide labor, materials and equipment as required to install the swimming pool electrical system including but not limited to:
 - 1. A complete and operable system of service equipment, switchboards, panelboards, conduits, switches, time clocks and wiring for power and lighting, motor control centers.
 - 2. Junction and/or pull boxes, conduits, disconnects, starters, contactors, wiring and connection of all motors and mechanical equipment, including connection and wiring of line voltage controls associated with the mechanical systems.
 - 3. Swimming pool underwater lighting systems.
 - 4. Swimming pool timing system outlets and scoreboard.
 - 5. Complete grounding system as required and shown on the Drawings.
 - 6. Adjusting and preliminary operation of the completed electrical system as described in Article 3.06, A of this Section.
 - 7. Cleaning of all completed Work and installation adjustment of all trim and decorative items.

1.02 QUALITY ASSURANCE

- A. Qualifications of Workers:
 - 1. The entity performing the work of this Section shall have been successfully engaged in the respective trade prior to commencement of the Work.
 - 2. For actual construction operations, use only trained and experienced workers with experience with the materials and methods specified.
 - 3. Provide at least one person who shall be present at all times during execution of the work of this Section, with experience with the type of materials being

installed, the referenced standards, and who shall direct all Work performed under this Section.

B. Ordinances and Codes: Materials and construction shall conform with all applicable code requirements, including:

1. National Electrical Code; Electrical Safety Orders of the State of California; Department of Industrial Relations; regulations of the State Fire Marshal; rules and regulations of the Board of Underwriters of the Pacific.
2. Chapter 31 of California Building Code, latest edition.

C. Verification of Conditions:

1. The locations shown on the Drawings are diagrammatic only and the exact finish location of equipment and materials cannot be indicated. Therefore, locations of all Work and equipment shall be verified to avoid interferences, preserve head room and keep openings and passageways clear. Changes shall be made in locations of equipment and materials which may be necessary to accomplish these purposes.

D. Preliminary Operations and Testing:

1. Motor driven equipment shall be tested for correct rotation and completion of all connections.

1.03 SUBMITTALS AND SUBSTITUTIONS

A. Provide submittals in conformance with the requirements of The "Whitebook".

B. Required submittals include:

1. Conduit and Fittings as specified in Article 2.02 of this Section.
2. Panelboards as specified in Article 2.06 of this Section.
3. Circuit Breakers as specified in Article 2.07 of this Section.
4. Motor Starters as specified in Article 2.10 and 2.11 of this Section.
5. Fuses as specified in Article 2.13 of this Section.
6. Time Clocks as specified in Article 2.14 of this Section.

7. Ground Fault Circuit Interrupters as specified in Article 2.15 of this Section.
- C. Submit proof of qualifications as specified in Article 1.02.A of this Section.

1.04 PRODUCT HANDLING

- A. Delivery: Deliver all materials to the Project Site in the manufacturer's original unopened containers with all labels intact and legible.
- B. Storage: Store all materials under cover in a manner to prevent damage and contamination, and store only the specified materials at the Project site.
- C. Protection: Use all means necessary to protect swimming pool electrical materials before, during, and after installation and to protect the installed Work specified in other Sections.

PART 6 - PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

- A. Materials shall be new, in unbroken packages and bear the U.L. label of approval.
- B. Equipment of one type shall be by same manufacturer. One type of equipment for classifications such as:
 1. Switchboards, panels, buss duct, disconnect switches and allied items.
 2. Conduit.
 3. Wire.
 4. Conduit fittings.
 5. Fixtures of the same general type.
 6. Wiring devices.

2.02 CONDUIT AND FITTINGS

- A. Conduit within or under buildings or where exposed outdoors shall be rigid threaded, hot dipped, galvanized, or U.L. approved plastic except where noted otherwise on the Drawings. Metallic conduit shall be of the same metal between outlets or terminals.
- B. Use flexible metallic conduit only for short connections of motors and where specifically called for on Drawings. Maximum length shall be 40". Use only liquid tight flexible metal conduit. Install an unbroken #12 AWG insulated copper grounding conductor in each liquid tight flexible conduit with permanent connection at motor junction box and service panel ground.
- C. Protect, before installation, metallic conduit runs in all slabs laid on grade or in contact with the earth or exposed in damp locations, with two (2) heavy coats of asphaltum rust-resisting compound.
- D. Encase conduits 2-1/2" or larger run underground, outside, or under buildings, in concrete envelopes a minimum of 3" thick, except as indicated otherwise on Drawings or stubouts. Conduits 2 and smaller laid 18" below finish surface in soil.
- E. Low voltage runs underground outside buildings, 1-1/4" or smaller, may be G.I. or sherardized steel conduit, with machine applied wrapping equal to double wrap or Scotch-Wrap #50 tape, half lapped and quadrupled at joints in lieu of concrete encasement.
- F. Service conduits through foundations or concrete members shall run through metal sleeves with adequate clearances for full movement of the conduit. Do not run conduits through footings.
- G. Secure conduits run exposed on surfaces with one hole heavy-duty straps or fasten with matching fittings to inserts or trapezes, parallel to building walls and ceilings.
- H. Cap all conduit or duct stub-outs with standard factory caps; except cap threaded steel conduit with B.I. water pipe caps in outdoor locations.

- I. Use conduit fittings as manufactured by Crouse-Hinds Company, Appleton Electric Co., or approved equal.
- J. Employ U.L. liquid tight fittings for use with liquid tight flexible metal conduit.
- K. Use unions as manufactured by Appleton, O-Z/Gedney, or approved equal. The use of running threads will not be permitted.
- L. Exposed conduit in chemical rooms shall be rigid NEMA 3R Type suitable for installation in corrosive atmospheres.

2.03 GROUNDING

- A. Bond together and ground to a common ground at a single point all metallic conduit, piping systems, pool reinforcing steel, metal parts of ladders, lifeguard stands, handrails and their supports and the like. The bonding conductor shall not be smaller than #8 copper.

2.04 WIRING CONNECTIONS

- A. Make connections without strain on conductors, allowing the conductors to take a natural position after connections or taps are made. Include all strand of wire in making the connection.
- B. Make connections for wiring by one of the following means:
 - 1. Make all taps or connections to conductors with compression type connectors except those smaller than #8 B&S gauge may have soldered connections. Solderless connections for #10 AWG or smaller may be used and shall be "Scotchlok", Buchanan, or approved equal. For #8 AWG or larger, they shall be T&B "LockTite", Burndy "Versitaps", or approved equal.
 - 2. All cable or conductor terminal lugs shall be Burndy "Quicklug", IlSCO, or approved equal. Two piece stamped lugs and solder lugs will not be approved.
 - 3. Paint taped splices in damp or outdoor locations with two (2) coats of insulating paint.

4. Tag all branch circuit wires with circuit number at the panelboard and at each point of use with linen or plastic tags.

2.05 CONDUCTORS

- A. Copper RHW or THW. Do not make splices between boxes.

2.06 COLOR CODING

- A. Neutrals (identified conductors shall be white).
- B. Phase conductors shall be red for phase B; blue for phase C.
- C. Green shall be used for mechanical equipment and receptacle grounds only.

2.07 MOTOR WIRING

- A. Make final connections to motors with the required AWG (Minimum #12), Flamenol machine tool wire, 19 strand. Control wiring for equipment shall be Flamenol machine tool wire, 19 strand of required AWG. Provide junction boxes at each item of equipment to change from standard building wiring to machine tool wire.
- B. Phase motors as proper in direction of rotation.

2.08 PANELBOARDS

- A. Panelboards shall be flush or surface mounting as indicated with circuit breakers as shown on panel schedule, hinged lockable doors, index card holders and proper bussing.
- B. Where indicated on the drawings, panelboards shall be furnished with subfeed breakers and/or lugs, split bussing, contractors, time switches, relays, etc., as required.

- C. All panelboards shall be keyed alike.
- D. All panelboards shall be finished with one coat of zinc chromate and coat of primer sealer after a thorough cleaning where exposed to public view (e.g., corridors, covered passages, offices, etc.) and gray in switchboard, janitor's heater and storage rooms. Prime coated panelboard shall be painted to match surroundings after installation. Panelboards shall be fabricated of sheet steel of the following minimum gauges: Doors and trim #12; enclosure - code gauge steel.
- E. Furnish all panelboards and terminal cabinets with Yale 46515 flush locks and LL806 keys except where indicated otherwise herein. Fasten the trim to panel boards and terminal cabinet by means of concealed, bolted or screwed fasteners accessible only when the door is open.
- F. Panelboards 208/120 volt, three phase, 4 wire, S/N or 120/240 volt, single phase, 3 wire, S/N.

Panelboard types as manufactured by:

Westinghouse	Type B10B
General Electric	Type NLAB
Square D	Type NQOB

- G. Panelboards for 480/277 volt, three panes, 4 wire, S/N.

Panelboard types as manufactured by:

Westinghouse	Type Pow-R-Line 2
General Electric	Type AE
Square D	Type NEHB
Sylvania	Type NH1B
I.T.E.	Type Approved Equal

- H. Panelboard for bussing sizes thru 400 amp shall be 20" wide surface mounted type. Recess mounted type shall have a 20" wide (maximum) recess metal enclosure with

trim plate cover extending 1" on all sides of enclosure. Depth shall be 5-3/4" nominal. Height of panel as required for devices.

- I. Provide 6" additional gutter space in all panels where double lugs are required, or where cable size exceeds bus size. Minimum bottom gutter space shall be 6" high. 12" additional gutter space may be required for aluminum feeders where used.
- J. Panelboards shown on the drawings with relays, time clocks or other control devices shall have a separate metal barriered compartment mounted above panel with separate hinged locking door to match panelboard. Provide mounting sub-base in cabinet for control devices and wiring terminal strips.
- K. Panelboard shall have a circuit index card holder removable type, with clear plastic cover. Index card shall have numbers imprinted to match circuit breaker numbers.

2.09 CIRCUIT BREAKERS

- A. Breakers shall have a minimum short circuit interrupting rating of 10,000A symmetrical for panelboard voltage thru 240 volt and 14000A for panelboards thru 600 volts or as specified on the drawings. In no case shall the interrupting rating be less than the bus withstand rating unless noted otherwise on the drawings.
- B. Circuit breakers as manufactured by the following companies only are acceptable:
 - 1. General Electric Company
 - 2. Square D Company
 - 3. Westinghouse Company
 - 4. I.T.E. Company
- C. Circuit breakers shall be arranged in the panels so that the breakers of the proper trip settings and numbers correspond to the numbering in the panel schedules on the drawings. Circuit numbers of breakers shall be black-on-white micarta tabs or other previously approved method. Circuit number tabs which can readily be changed from front of panel will not be accepted. Circuit number tabs shall not be attached to or be a part of the breaker.

- D. Where two or three pole breakers occur in the panels, they shall be common trip units. Single pole breakers with tie-bar between handles will not be accepted.
- E. All circuit breakers shall be padlockable in the "off" position. Locking facilities shall be riveted or mechanically attached to the circuit breaker (submit sample for approval). Other means of attachment shall not be accepted without prior written approval of Architect.
- F. Where branch circuit breakers supply the power to motors and signal systems, the breakers shall be furnished with lockout clips, mounted in the "on" position. The breakers shall be able to trip automatically with lockout clips in place.
- G. Panelboard circuit breakers shall be bolt-on type.

2.10 BUSSING

- A. Bussing shall be rectangular cross section copper, or full length silver or tin-plated aluminum.
- B. Bussing shall be braced to withstand symmetrical short circuit ratings as follows or as noted on drawings. In no case shall bus short circuit bracing be less than specified circuit breakers.
- C. Each panelboard shall be equipped with a ground bus secured to the interior of the enclosure. The bus shall have a separate lug for each ground conductor. No more than one conductor shall be installed per lug.

2.11 TERMINAL CABINETS

- A. Terminal cabinets shall be fabricated of code gauge sheet steel for flush mounting (except where noted a surface) of size indicated on the drawings, and complete with hinged lockable doors and the number of 2-way screw terminals required for termination of all conductors. Terminal cabinet locks to operated form same key used for panelboards. The trim to terminal cabinets shall be fastened by means of concealed bolted or screwed fasteners accessible behind door to terminal cabinets. Terminal cabinets shall have 5/8" plywood backing. Cabinets shall be finished with one coat of zinc chromate and one coat of primer sealer after a thorough cleaning where exposed

to public view Prime coated cabinets shall be painted to match surroundings after installation.

- B. Provide engraved nameplate on each cabinet indicating its designation and system (i.e., Swimming Pool - Panel 'SP').

2.12 MOTOR CONTROL INDIVIDUAL STARTERS

A. Manual Motor Starters:

1. Provide flush or surface mounting manual motor starters with number of poles and size of thermal overload heaters as required for the motor being controlled (equipped with overload heaters, one for each motor lead). Back boxes shall be supplied with all flush mounting starters whether they are toggle type requiring only a 4" square outlet box or the larger type requiring a special box and cover designed to accept the particular unit.
2. Unless otherwise noted on the drawings, all manual starters for single phase motors, smaller than 1 h.p., shall be the compact toggle type. Manual starters for all single phase motors, 1 to 5 h.p., and all three phase motors up to 5 h.p. shall be the heavy duty type.
3. Where manual motor starter is shown with pilot light, the pilot light shall be installed in a separate outlet box adjacent to the starter outlet, and engraved nameplate in indicate function of pilot light.
4. The following motor starters as manufactured by:

Manufacturer	Single Phase 1HP and Below	Others
Arrow Hart	Type RL	Type LL
General Electric	CR 101	Class CR 1062
I.T.E.	Class C10, C11 or C12	Class C20
Square D Company	Class 2510, Type A	Class 2510, Type B & C
Westinghouse	Type MS	Type A100
Allen Bradley	Approved Equal	Approved Equal.

B. Individual Magnetic Motor Starters:

1. Magnetic motor starters shall be A.C. line voltage, across-the-line units in NEMA Type I enclosure, unless other types of enclosures are indicated.
2. All starters located outside of a building whether or not indicated shall be W.P. (weatherproof), and all starters noted W.P. shall be furnished in NEMA type 4 cast or stainless steel enclosures.
3. Starter shall be horsepower rated for the motor controlled, and shall be equipped with properly sized overload elements. Every pole shall be with overload element.
4. Verify the exact motor current and voltage characteristics with the Contractor supplying the motor before installation of a starter.
5. Each starter shall be equipped with "Hand-Off-Auto" switch or stop-start pushbutton as required.
6. Coils shall be designed to operate on voltage indicated on control diagrams and have built-in-under the voltage release for coil circuit to drop motor starter off the line when the line voltage drops below normal operating voltage.
7. The coil control circuit shall be independently fused, sized to protect coil.
8. Starters to be equipped with running pilot light indication with a "Push-to-Test" feature.
9. Magnetic starters shall have a minimum of two auxiliary contacts. Additional auxiliary contacts shall be provided as required to comply with the requirements of the wiring diagrams on the electrical and mechanical drawings and the description of the function in the Mechanical Section of the Specifications.
10. Minimum starter size shall be NEMA size I unless indicated otherwise.
11. The following types of magnetic motor starters as manufactured by:

Manufacture	Type
General Electric	Class CR 106
I.T.E.	Class A20
Square D Company	Class 8536
Westinghouse	Type A200 (Size 4 Max.) or Class II-200 (Sizes 5-8)

2.13 INDIVIDUAL COMBINATION MOTOR STARTERS

- A. Combination starter shall incorporate fused disconnect switch and individual magnetic motor starter in a common enclosure. Combination starters shall be mounted in general purpose enclosures unless otherwise indicated on the plans. Starters shall comply with NEMA standards, size and horsepower as indicated on drawings General Electric, Square D, Westinghouse or I.T.E.
- B. The disconnect handle used on combination starters shall control the disconnect device with the door opened or closed. The disconnect handle shall be clearly marked as to whether the disconnect device is "ON" or "OFF", and shall include a two-color handle grip, the black side visible in the "OFF" position indicating a safe condition, and the red side visible in the "ON" position indicating an unsafe or danger condition.
- C. All starters used in combination starters shall be manufactured in accordance with the latest published NEMA standards, sizes, and horsepower ratings. These starters shall be furnished with three melting alloy type thermal overload relays.
- D. Thermal units shall be of one-piece construction and interchangeable. The starter shall be inoperative if a thermal unit is removed.

2.14 MOTOR CONTROL INTERLOCKS AND CONTROL DEVICES

- A. Refer to mechanical and plumbing drawings and specifications and provide all control devices including timeswitches, relays and interconnection of starters of required.
- B. Mount all relays and timeswitches in a separate compartment in motor control center unless otherwise indicated.
- C. Whether shown on mechanical and plumbing drawings or control center schedules or not, where motors are controlled by external devices (i.e., thermostats, relays, float or pressure switches, etc.) or interlocked with other motors, each motor starter to be equipped with a "Hand-Off-Auto" selector switch in starter cover. Other starters equipped with a "Start/Stop" pushbutton station in starter cover.

2.15 FUSES

- A. Fuses shall be dual element, current limiting type, U.L. Class RK5 unless otherwise indicated on the drawings. Provide one spare set of fuses of each size and type in each motor control center.

2.16 TIME CLOCKS

- A. Time clocks shall be provided for all underwater lighting systems and swimming pool circulation pumps not controlled by filter microprocessors.
- B. Contacts shall have a minimum rating of 40 amperes at 277V.
- C. Timing motor shall be heavy duty synchronous, self starting, high torque type, and shall be rated at 120, 208, 240, 277 volt 60 Hz.
- D. Motor shall operate normally at temperature range of -60 degrees Fahrenheit to +120 degrees Fahrenheit.
- E. Dial shall be 3" diameter, clearly calibrated with day/night zones and 24 hour rotation, with gear to provide one revolution yearly which automatically varies the on/off settings each day according to seasonal changes. Day and month of the year shall show clearly through calendar window on the dial.
- F. Time clocks shall be equipped with 7-spoke omitting wheel marked with days of the week.
- G. Time clocks shall be housed in a flush enclosure where supply circuits emanate from a flush mounted panelboard and surface enclosure when supply circuits are from a surface mounted panel.
- H. Acceptable manufacturers are Tork, Paragon, or approved equal.

2.17 GROUND FAULT CIRCUIT INTERRUPTERS

- A. Minimum rating shall be 20 amperes, 125V, 5 milliampere trip setting, Class A per UL943.

- B. Manufacturer to be Crouse-Hinds, Leviton, or approved equal.

2.18 BOXES

- A. Boxes shall be of the size required by ordinances or larger, and of pressed galvanized code gauge steel where concealed or exposed on ceilings. Exposed boxes on walls below 7'6" shall be cast steel similar to "FA" condulets.
- B. Outlets to be surface where wiring is exposed and flush in areas where conduit is concealed.
- C. Provide surface outlets with proper galvanized steel surface cover. Box and cover shall be deep enough to provide at least 1/4" clearance between back of device and back of box. Where box contains more than one device, use proper gang box with proper cover. Surface outlet boxes shall be of the threaded hub type wherever below 8'0".
- D. Provide exposed junction boxes with proper flat blank galvanized cover. If necessary for cable installation, additional pull boxes or junction boxes may be installed in accessible locations.
- E. Where pull boxes larger than outlet boxes are required, galvanized code gauge sheet steel boxes may be used with covers attached by brass machine screws. Boxes exposed to the weather shall be approved for the purpose, and conduit entrances shall be on the bottom made by means of an interchangeable hub with gasket and adapter nut. Pull boxes not shown on Drawings may be added only after approval of size and location is obtained.
- F. For outlets exposed to weather or where noted, cast outlet boxes shall be Crouse-Hinds, Appleton, or approved equal. Boxes shall have proper number and size hubs. Device plates, covers, adapters and boxes shall be as manufactured by Crouse-Hinds, Appleton, or approved equal.
- G. Exposed junction boxes, outlet boxes and pull boxes for pool chemical rooms shall be NEMA 3R type suitable for corrosive atmosphere, non-metallic.

2.19 IDENTIFICATION MARKINGS

- A. Plainly mark all motor and electrical appliance control equipment indicating the equipment controlled with engraved metal tags.
- B. Provide laminated plastic nameplates on panelboards on the outside of the door at the top indicating panel designation and feeder source.
- C. Provide laminated plastic nameplates on distribution switchboards and motor control centers at the top center indicating panel designation and feeder source.
- D. Identify each distribution switchboard and motor control center circuit breaker with a laminated plastic nameplate indicating its' use.
- E. Type panelboard directories on the forms provided with the equipment, indicating the use of each branch circuit breaker.
- F. Fasten all laminated plastic nameplates to surfaces with two (2) or more screws.

PART 7 - PART 3 EXECUTION

3.01 INSPECTION

- A. Verify conditions at the Project site before submitting bid. Be responsible for providing all necessary wiring for the new electrical systems. Wherever wiring is being disrupted due to remodeling or changes, reconnect existing and provide new wiring circuits to accomplish a fully operable system at no additional cost to the Owner.

3.02 COORDINATION

- A. The Drawings are essentially diagrammatic and indicate the desired location, size, routes, connection points, etc., and are to followed as closely as possible. Proper judgment must be exercised in executing the Work so as to provide the best possible installation in the available space and to overcome difficulties, limitations or interference wherever encountered. Be responsible for the correct placement of this

Work, the proper location and connection in relation to Work of other trades, for determining the exact location of all conduits, outlets and equipment, and for installing the conduits in such a manner as to conform to the structure, avoid obstruction, preserve headroom and keep openings and passageways clear. Particular attention is directed to the close coordination required on exposed Work. Locations shown on Architectural or Mechanical Drawings if different than those shown on Electrical Drawings should be communicated to the Owner's Representative in writing for clarification.

3.03 INSTALLATION

A. Trenching and Backfill: Conform with requirements of Section 131101. Provide minimum cover as required by Code.

B. Conduit Installation:

1. Conduit and metallic raceway systems shall be mechanically and electrically continuous from sources of current to all outlets in a manner to provide a continuous grounding path. Close ends of conduit during construction to prevent entrance of dirt or moisture.
2. Securely fasten conduit to the building construction within three feet of each outlet and within every ten feet thereafter. Secure it to boxes, cabinets, pull boxes, terminals with two locknuts and ends equipped with bushings or a terminal fitting. Cut square with ends carefully reamed.
3. Make bends or elbows so that the conduit will not be injured or flattened.
4. Use insulated metallic bushings in all places where bushings are required.
5. Run exposed conduits level or plumb and parallel to the construction members of the building. No cutting across or diagonal runs will be permitted. Neatly surmount structural obstructions encountered on conduit runs by the use of fittings or pull boxes.
6. Identify feeder conduits by stamped metal tags secured to exposed section of conduit in main or sub-panels.
7. Make up all threaded conduit joints gas and watertight with conductive sealer except conduit above ground in dry indoor locations.
8. Rigidly support all boxes independently of the conduit system.

C. Connections to Equipment:

1. Fully connect, in an approved manner, all electrical outlets, apparatus, motors, equipment, fixtures, wiring devices and appliances whether they are installed under the Electrical Contract or not, which require electrical connections, to the corresponding electrical system outlet.
2. Where the Work of this Section requires connections to be made to equipment that is furnished and set-in-place under other Sections, obtain such roughing-in dimensions from the manufacturer or supplier of each item as required and assume full responsibility for the installation of the connections thereto.

3.04 ADJUSTMENT AND CLEAN-UP

- A. Preliminary Operation: Should the Owner's Representative deem it necessary to operate the electrical installation or any part thereof prior to Substantial Completion of the Work, consent to such preliminary operation and supervise conduction of same. Subcontractor shall pay all costs occasioned by such operation. Preliminary operation shall not be construed as an acceptance of any Work installed under this Contract.
- B. Clean-up: Upon completion of the Work of this Section, immediately remove all swimming pool electrical materials, debris and rubbish occasioned by this Work to the approval of the Owner's Representative.

END OF SECTION

SECTION 220500 Common Work Results For plumbing

PART 1 - GENERAL

1.1 CODES AND STANDARDS

- A. All work and materials shall be in full accordance with the latest rules and regulations of the State Fire Marshal, the Safety Orders of the Division of Industrial Safety, the California Building Code, the California Mechanical Code, the California Plumbing Code the California Electrical Code, Local Building Codes, and other applicable codes, laws or regulations of bodies lawfully empowered and having jurisdiction over this project. Nothing in the plans or specifications is to be construed to permit work not conforming to these codes.

1.2 SEISMIC ANCHORAGE AND BRACING

- A. All equipment and piping shall be anchored or braced in accordance with the California Building Code. The contractor is responsible for providing anchorage or bracing for all equipment regardless of whether detailed or shown on the plans. All equipment and ductwork supports not detailed as shown on the plans, requires approval of a registered structural engineer.
- B. All piping shall be supported or braced in accordance with the SHL-A "Seismic Restraint Manual: Guideline for Mechanical Systems" latest approved edition, Superstrut "Seismic Restraint System", Unistrut Corp. "Seismic Bracing For Ductwork, Conduit, and Cable Tray Supports", or B-Line "Seismic Restraints." If the pipe size exceeds the size included in these manuals, custom designed supports are required. All custom supports require the approval of a registered Structural Engineer. All shop drawings and calculations shall be submitted prior to fabrication.
- C. All flexibly mounted equipment shall be provided with seismic vibration isolation devices designed in accordance with the California Building Code. All anchors and equipment connections shall be submitted. All seismic vibration isolation devices shall be submitted with structural calculations signed by a Registered Structural Engineer in the State of California.

1.3 PERMITS

- A. The Contractor shall obtain all permits, patent rights, and licenses that are required for the performance of his work by all laws, ordinances, rules and regulations or orders of any officer and/or body, shall give all notices necessary in connection therewith, and pay all fees relating thereto and all costs and expenses incurred on account thereof. No work shall be covered before inspection by the jurisdictional inspector and the Architect.

1.4 CUTTING AND PATCHING

- A. Perform all cutting and fitting required for work of this section in rough construction of the building.
- B. All patching of finished construction of building shall be performed under the sections of specifications covering these materials.
- C. All cutting of concrete work by this Contractor shall be by core drilling or concrete saw. No cutting or coring shall be done without first obtaining the permission of the Architect.

1.5 GENERAL

- A. Unless otherwise specified herein, all equipment and fixtures shall be installed in accordance with the manufacturer's recommendations.
- B. Before submitting his bid, the Contractor for the work under this section shall carefully study all drawings, and shall make a careful examination of the premises. He shall definitely determine in advance, the methods of installing and connecting the apparatus, the means to be provided for getting any equipment into place, and shall make himself thoroughly familiar with all the requirements of the contract. After award of the contract, no subsequent allowances will be made to the Contractor due to his failure to comply with the above requirements and any other conditions affecting the installation and completion of all work.
- C. Workmanship: All labor shall be carefully skilled for this kind of work, thorough and first class in all respects and under the direction of a competent foreman.
- D. Special Note: Any work called for on plans shall be installed whether or not mentioned in these specifications.

1.6 VERIFICATION OF LEAD CONTENT IN PLUMBING PRODUCTS

- A. Comply with California Health and Safety Code 116875 (AB 1953-2006) Lead Content in Plumbing Products for valves and fittings. All valves 2" and smaller and all fittings 2" and smaller for installation in the domestic water system, whether serving a fixture providing domestic water for human consumption or serving a fixture providing domestic water to a fixture not normally considered as for use for human consumption shall be provided with valve and fittings that have been verified by an independent evaluation service as meeting the requirements of the California Health and Safety Code 116875 (AB 1953-2006). When valves or fittings larger than 2" are required and verified products are available from the specified manufacturer(s), verified valves and fittings shall be submitted for approval and provided, as approved.
- B. Comply with California Health and Safety Code 116875 (AB 1953-2006) Lead Content in Plumbing Products for piping specialties installed in the domestic water system whether serving a fixture providing domestic water for human consumption or serving a fixture providing domestic water to a fixture not normally considered as for use for human consumption shall have been verified by an independent evaluation service as meeting the requirements of the California Health and Safety Code 116875 (AB 1953-2006).

When piping specialty item larger than 2" is required, and a verified product is available from the specified manufacturer(s), the verified plumbing specialty item shall be submitted for approval and provided, as approved.

1.7 DAMAGE BY LEAKS

- A. This Contractor shall be responsible for damage to the grounds, walks, roads, buildings, piping systems, electrical systems and their equipment and contents, caused by leaks in the piping systems being installed or having been installed herein. He shall repair at his expense all damage so caused. All repair work shall be done as directed by the Architect.

1.8 EMERGENCY REPAIRS

- A. The Owner reserves the right to make emergency repairs as required to keep equipment in operation without voiding the Contractor's guarantee bond nor relieving the Contractor of his responsibilities.

1.9 EXPLANATION AND PRECEDENCE OF DRAWINGS

- A. For purposes of clearness and legibility, drawings are essentially diagrammatic, and, although size and location of equipment are drawn to scale wherever possible, Contractor shall make use of all data in all the contract documents and shall verify this information at building site.
- B. The drawings indicate required size and points of termination of pipes, and suggest proper routes to conform to structure, avoid obstructions and preserve clearances. However, it is not intended that drawings indicate all necessary offsets, and it shall be the work of the Contractor to make the installation in such a manner as to conform to structure, avoid obstructions, preserve headroom and keep openings and passageways clear, without further instructions or cost to the Owner.
- C. It is intended that all apparatus be located symmetrical with architectural elements. Refer to architectural details in completing the correlating work.
- D. The contractor shall be fully informed regarding any and all peculiarities and limitations of the spaces available for the installation of all work and materials furnished and installed under the contract. The contractor shall exercise due and particular caution to determine that all parts of his work are made quickly and easily accessible.
- E. The Contractor shall study all drawings and specifications to determine any conflict with ordinances and statutes. Any errors or omissions shall be reported, and any changes shall be shown in the as-built drawings and the additional work performed at no cost to the Owner.
- F. Submittal of bid shall indicate the Contractor has examined the site and drawings and has included all required allowances in his bid. No allowance shall be made for any error

resulting from Contractor's failure to visit job site and to review drawings, and bid shall include costs for all required drawings and changes as outlined above, all at no cost to Owner.

1.10 SUPERVISION AND COOPERATION

- A. This Contractor shall include the services of experienced superintendents for each sub-section who shall be constantly in charge of the work, together with the qualified journeymen, helpers and laborers, required to properly unload, install, connect, adjust, start, operate and test the work involved, including equipment and materials furnished by others and by the Owner.
- B. The work under this section shall be executed in cooperation with the work of other trades to prevent conflict or interference and to aid rapid completion of the overall project.

1.11 OPERATION

- A. The Owner may require operation of parts or all of the installation for beneficial occupancy prior to final acceptance. Refer to General Conditions of the Contract.
- B. Cost of utilities for such operation shall be paid by the Owner. Said operation shall not be construed as acceptance of the work.

1.12 UTILITY SERVICES DURING CONSTRUCTION

- A. All water and electric power used for construction shall be paid for by the Contractor.

1.13 COORDINATION

- A. Coordinate layout and installation of piping and suspension system components with other construction, including light fixtures, HVAC ductwork / equipment, electrical conduit, fire suppression system components, and partition assemblies.
- B. Coordinate pipe sleeve installations for foundations wall penetrations.
- C. Coordinate installation of pipe sleeves for penetrations through exterior walls and floor assemblies.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND PANELS:

- A. Wherever valves, air vents, or other items or parts of the installation which require periodic inspection or adjustment are concealed by permanent non-removable construction, an access door or panel shall be provided. Installation of access doors to

be coordinated by general contractor. Types to be submitted and approved for the surface, and construction in which it is installed. Access door to be manufactured by Mifab, Inc., or approved equal, and be Series CAD or UA, or series MFRU for fire rated walls.

PART 3 - EXECUTION

3.1 INSTALLATION OF PLUMBING SYSTEMS

- A. No holes for pipe or equipment will be allowed in any structural members without written consent of the Architect. Where pipes are to pass through or interfere with any member, or where notching, boring or cutting of the structure is necessary, the work shall be done by the Contractor as directed by the Architect.
- B. The Contractor shall, at a time in advance of the work, coordinate with other disciplines as to his requirements for openings, recesses, and chases in the walls, partitions, or framing. Should furnishing this information be neglected, delayed, or incorrect and additional cutting is found to be required, the costs of same shall be charged to the Contractor.
- C. Sleeves through foundation walls shall be standard weight black steel pipe, flush with walls and two pipe sizes larger than the pipe passing through. Sleeves shall be caulked with oakum to within 1" of the wall lines and then completely filled with an approved bitumastic compound. Sleeves for piping through masonry wall above grade or floor or through floors shall be #10 gauge galvanized sheet steel and shall extend completely through the walls, or floor finishing flush on both sides. Sleeves shall be 1/2" larger than the pipe passing through with oakum caulking to make opening airtight. Sleeves through concrete firewalls or floors shall be packed with suitable non- combustible material. Provide and install polished chromium plate brass floor ceiling on wall plates for all pipes, exposed in finished portions of the buildings.
- D. All scaled and figured dimensions are approximate and are given for estimate purposes only. Before proceeding with any work, this Contractor shall carefully check and verify all dimensions, sizes, etc., and shall assume full responsibility for the installation with respect to other parts of the equipment, and to the structure.
- E. Any minor changes in work, which has not been installed, shall be made by this Contractor without additional compensation, except changes that are caused by architectural revisions that increase or decrease the size of the materials specified or indicated on the drawings.
- F. This Contractor shall submit an estimate of the cost of or credit for such changes he does not consider of a minor nature and shall proceed only upon the written authority of the Architect.
- G. Coordinate all sanitary vents through roof with HVAC equipment. Terminate all vents at least 10'-0" from any outside air intakes.

- H. Pipes Over Electrical Equipment: Where pipe joints or valves in pipes conveying water occur within 3' in a horizontal direction, of electrical panels and electronic equipment, provide a drip pan of galvanized steel construction of a size which will afford maximum protection.
 - 1. Pans: 24 gauge, edges turned up 2-1/2" all sides, reinforced with galvanized steel angles or by rolling edge over 1/4" diameter steel rod.
 - 2. Provide drain with 3/4" brass flange and copper pipe to floor.
 - 3. Support the pan with bars or angles, brace to prevent sagging or swaying.
- I. Install chrome plated split escutcheons around all pipes passing through finished walls, floors and ceilings.

3.2 TESTS AND ADJUSTMENTS

- A. No piping work, fixtures, or equipment shall be concealed or covered until inspected and approved by the Engineer, who shall be notified when the work is ready for inspection. All work shall be completely installed, tested as required by this section and the State Ordinances and State Safety Orders, and shall be leak-tight before inspection is requested. All tests shall be repeated upon request to the satisfaction of those making the inspection.
- B. Disinfection of the potable water system prior to use shall meet the requirements of the California Plumbing Code section 609.9. The method to be followed shall be that prescribed by the Health Authority or, in case no method is prescribed by it, the following:
 - 1. The piping system shall be flushed with clean, potable water until only potable water appears at the points of outlet.
 - 2. 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 filled with a water-chlorine solution containing at least two hundred (200) parts per million of chlorine and allowed to stand for three (3) hours.
 - 3. 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.
 - 4. The procedure shall be repeated if it is shown by bacteriological examination made by an approved agency that contamination persists in the system.
- C. Piping tests shall be made with the medium and under pressure listed below. Use a calibrated Bristol Pressure Recorder on all tests. Recorder range shall be 0 - 300 pounds or required range for specific test.

Type of System	Gauge Pressure (Lbs. per sq. inch, gauge)	Test Medium
1. Soil, Waste, Vent Piping Within Building	Minimum of 5 psi for each joint, for duration of test with no loss in pressure.	Water
2. Domestic Water	150 PSI	Water

D. Test pressure in pounds per square inch, gauge, are given as initial pressure to be applied to lines being tested, together with test medium.

E. Tests are to be applied for a minimum period of twenty-four (24) hours and until tests are complete.

F. Final pressures at the end of test period shall be no more nor less than that caused by expansion or contraction of the test medium due to temperature changes.

3.3 DRAWINGS OF RECORD

- A. Provide reproducible "as-builts" for the purpose of showing a complete picture of the work as actually installed. Copies of the contract drawings can be made available upon request at cost to the contractor.
- B. These drawings shall serve as work progress report sheets and the Contractor shall make all notations, neat and legible, thereon daily as the work proceeds. The drawings shall be available for inspection at all times and shall be kept at the job at a location designated by the Architect.
- C. At completion of the work, these as-built drawings shall be signed by the Contractor indicating his approval, dated and returned to the Architect.
- D. Invert elevations for buried piping and conduit. The dimensions location of all concealed raceway shall be accurately recorded on the "as-built" drawings. Elevation, on Mean Sea Level base, of all piping and conduit runs outside the building shall be recorded.

3.4 FINAL INSPECTION

- A. If upon final completion of the final inspection and review of the maintenance manuals and "as-built" drawings, the list of required corrections is such that a re-inspection is required, the contractor will be subject to a charge of Ninety Dollars (\$90.00) per hour for any additional time required.

3.5 GUARANTEE

- A. All work under this section shall be guaranteed in writing in accordance with the General Provisions.
- B. All material except as otherwise noted shall be new, free from defect and of the quality and rating shown or specified.
- C. Any defect due to missing or improper material or faulty workmanship existing or developing during the warranty period shall be corrected and the resulting damage repaired without additional cost to the Owner.
- D. The warranty period shall be one year from date of acceptance of the project.

END OF SECTION 220500

SECTION 220529 Hangers and supports for plumbing

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Work included shall be as indicated on the drawings, including but not limited to the following:
 - 1. Pipe Hangers
 - 2. Supports

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

- A. All pipe hangers and supports installed in exterior location shall be galvanized.
- B. Split ring hangers with swivel adjuster, solid rods and rod sockets: Steel pipe Fee and Mason Fig. 212, or Super-Strut M-718T.
- C. Adjustable Beam Clamps: Fee and Mason Fig. 246 or Super-Strut Fig. CM-754 (where this type is not adaptable, an approved top beam, side beam, or channel clamp by Fee and Mason or Super-Strut, will be acceptable).
- D. Trapeze Hangers: Super-Strut A-1200 or Unistrut P-1000 channel with pipe clamps and guides as required (include type to be used in submittal).
- E. Riser Clamps (4" Pipe and Less): Fee and Mason Fig. 241 or Super-Strut C-720.
- F. Offset Pipe Clamps: Fee and Mason Fig. 366, or Super-Strut C-720L.
- G. Pipe Isolation: All piping shall be isolated from dissimilar metals, other piping, any part of the building, framing, conduit, supports etc., with Elmdor/Stoneman Series 500 trisolator or approved equal.

PART 3 - EXECUTION

3.1 PIPE HANGERS AND SUPPORTS

- A. Horizontal piping shall be supported as follows: Use beam clamps for attachment to structural steel surfaces and expansion type inserts for attachment to concrete surfaces. Clamps and inserts shall be sized for the required hanger rod and comply with all applicable codes and safety regulations. The use of "C" clamps designed to attach

threaded rod to one side of a steel beam flange shall not be used unless they are provided with a restraining strap, or hook to the opposite beam flange.

- B. Piping shall be firmly held in place by adjustable split ring malleable iron hangers, supports and pipe rests, located adjacent to fittings at each offset or change of direction, at the ends of branches over 5' long, at riser pipes and along piping where necessary to prevent sags, bends, or vibration. All hangers and supports shall be of a design that will support the combined weight of pipe, fluid and insulation.
- C. Pipe straps shall be heavy gauge galvanized iron factory fabricated to fit against supporting surface when installed. Makeshift devices will not be acceptable. No plumbing tape is allowed.
- D. Lateral bracing shall be provided at every fourth hanger where hanger rods are more than 18" in length.
- E. Hangers supported by concrete structure shall be attached by cast iron manufactured concrete inserts installed at the time concrete is poured and each insert shall be provided with through rods lapped over structural reinforcing.
- F. Hangers supported by structural steel shapes shall be attached by cast-iron clamps designed for use on the specific steel shape and equipped with retainers.
- G. All hangers shall be attached to halter rod by means of adjustable swivel, turnbuckle or double nut to allow height adjustment.
- H. Vertical piping shall be suitably supported from the building structure where required by means of malleable iron or steel pipe clamps of ample size, either bolted or welded to the pipe and supported at the floor slab. Supports where indicated on the drawings shall also act as anchors to allow for expansion and contraction of the piping. Provide rubber isolators for clamps where required for elimination of vibration and sound to the structure.
- I. Miscellaneous Supports: Wall brackets, etc., shall be provided where required in accordance with the best standard practice of the trade in a manner as approved by the Architect.
- J. In the event additional structural steel is required to transmit loads to main structure, it shall be provided at no additional cost to the Owner.
- K. Soil, Waste, Vent and Down Spouts: Hanger rod sizes shall be as follows:

1-1/2" to 2" Pipe	3/8" Rod
2-1/2" to 3-1/2" Pipe	1/2" Rod
4" to 5" Pipe	5/8" Rod
- L. Domestic Water:

1. Hanger Spacing shall be as Follows for Copper Tubing:

1/2" to 3/4" Pipe	5'-0"
1" Pipe	6'-0"
1-1/4" Pipe	7'-0"
1-1/2" to 2" Pipe	8'-0"

2. Hanger Rod Sizes shall be as Follows:

3/4" to 2" Pipe	3/8" Rod
2-1/2" to 3-1/2" Pipe	1/2" Rod

- M. For horizontal installations, hangers or supports shall be provided for at least every other joint except when the developed length between supports exceeds 4'. If the developed length exceeds 4', hangers or supports shall be provided at each joint. Supports shall also be provided at each horizontal branch connection. Hangers, supports, or blocks shall be adequate to maintain alignment and prevent sagging or joint separation. Hangers, supports or blocks shall be placed on, or immediately adjacent to, the coupling, not to exceed 18". Adequate provisions shall be made to prevent "shear."
- N. Vertical "no-hub" components shall be secured at each stack base, and at sufficiently close intervals to keep system in alignment and to adequately support the weight of the pipe and its contents.
- O. Trap arms and similar branches must be firmly secured against movement in any direction. Closet bends shall be stabilized by firmly strapping and blocking. Where vertical closet stubs are used, they must be completely stabilized against all horizontal movement.

END OF SECTION 220529

SECTION 220533 Plumbing Identification

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Work included shall be as indicated on the drawings, including but not limited to the following:
 - 1. Equipment Labels
 - 2. Pipe Labels
 - 3. Stencils

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated submit list of wording, symbols, letter size, and color coding for identification of plumbing.
- B. Samples: Included with the above submittals, shall be samples of each identification material and device used.

1.3 Coordination

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 Pipe Labels

- A. Manufacturers:
 - 1. Seton Name Plate Corp
 - 2. Craftmark Identification Systems
 - 3. Bunting Mechanical Identification Systems
 - 4. Or Approved Equal
- B. General Requirements: Preprinted, color-coded with lettering indicating service, and showing flow direction.

- C. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.
- D. Self-Adhesive Pipe Labels: Printed plastic with contact type permanent adhesive backing.
- E. Pipe Label Contents: Including identification of piping service using same designations or abbreviates as used on drawings, pipe size, and an arrow indicating flow direction.
 - 1. Flow Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2" high.
- F. Letter Color: See section 3.2-A.3 below.
- G. Background Color: See section 3.2-A.3 below.

2.2 Stencils

- A. Manufacturers:
 - 1. Seton Name Plate Corp
 - 2. Craftmark Identification Systems
 - 3. Bunting Mechanical Identification Systems
 - 4. Or Approved Equal
- B. General Requirements: Prepared with letter sizes according to ASME A13.1 for piping and minimum letter height of 3/4" for access panel and door labels, equipment labels, and similar operational instructions.
- C. Material: Metal
- D. Stencil Paint Color: Exterior, gloss, black unless otherwise indicated. Paint me be in pressurized spray-can form.
- E. Identification Paint: Exterior in colors according to ASME A13.1 unless otherwise indicated.
- F. Letter Color: See section 3.2-A.3 below.
- G. Background Color: See section 3.2-A.3 below.

PART 3 - EXECUTION

3.1 Preparation

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulates.

3.2 Installation

A. Pipe Labels

1. Stenciled Pipe Label Option: Stencil labels may be provided instead of manufactured pipe labels, at installer's option. Install stenciled pipe, complying with ASME A13.1, on each piping system.
 - a. Identification Paint: Use for contrasting background.
 - b. Stencil Paint: Use for pipe marking
2. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums, and exterior exposed locations as follows:
 - a. Near each valve and control device.
 - b. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - c. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - d. At access doors, manholes, and similar access points that permit view of concealed piping.
 - e. Near major equipment items and other points of origination and termination.
 - f. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
 - g. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
3. Pipe Label Color Schedule:
 - a. Domestic Water Piping
 - 1) Background Color: Green
 - 2) Letter Color: White
 - b. Sanitary Waste Piping
 - 1) Background Color: Grey
 - 2) Letter Color: White

END OF SECTION 220533

SECTION 221100 DOMESTIC WATER PIPING AND SPECIALTIES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Work included shall be as indicated on the drawings, including but not limited to the following:
 - 1. Copper Pipe
 - 2. Valves and Fittings
 - 3. Piping Specialties

1.2 Quality assurance

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of plumbing specialties and are based on the specific system indicated.
- B. Plumbing specialties shall bear label, stamp, or other markings of specified testing agency.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for piping materials and installation.
- E. NSF Compliance:
 - 1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components. Include marking "NSF-PW" on plastic potable-water piping and "NSF-DWV" on plastic drain, waste, and vent piping.
 - 2. Comply with NSF 61, "Drinking Water System Components--Health Effects, Sections 1 through 9," for potable domestic water plumbing specialties.

PART 2 - PRODUCTS

2.1 All Domestic Water Piping:

- A. Above grade shall be type "L" copper tubing hard drawn with wrought copper solder sweat fittings. Where below grade and within 5' of building line, shall be type "K" copper tubing in single continuous length with polyethylene outer tubing.

2.2 VALVES AND FITTINGS

- A. Stops (Lead Free): Heavy pattern brass chrome plated with 3/8" O.D. compression outlet, 1/2" I.P.S. inlet and riser to match application. Provide stuffing box lock-shield with loose key and shallow stainless steel escutcheon in all exposed public applications. Note: Valve must weigh no less than 6.5 ounces. Dual outlet stops shall be provided with optional brass stem. Stops shall be Brass Craft Compliant KT or approved equal.

2.3 PIPING SPECIALTIES

- A. Unions in Copper Tubing 2" and Smaller: ANSI B16.18 cast bronze union coupling or ANSI B15.24 class 150 bronze flanges. Nibco 733.
- B. Dielectric Fittings:
 - 1. Provide fittings and unions to install between pipes made of dissimilar metals. Unions shall be factory certified to withstand a minimum of 600 volts on a dry line with no flash over and shall be rated to 180°F at 250 PSI. Flanged fittings shall have a bolt isolator to insulate each bolt in the flange and shall be rated at 175 PSI. Bolts shall be constructed of durable, corrosion resistant polysulfone. Flanged fittings shall have a Standard Gasket "A" (GA) suitable for water, air, oil, natural gas, propane, gasoline, kerosene, mineral oil, vegetable oil and alkalines in 210°F at 250 PSI. Threaded end connections shall meet ANSI B2.1 and flanged fittings shall meet ANSI B16.42 (iron) and ANSI B16.24 Bronze. Unions shall conform to ANSI B16.39, including hydrostatic strength and air pressure testing. Dielectric fittings and unions shall be constructed of the following materials:

a.	Gray Iron	ASTM A48-83
b.	Malleable iron parts	ASTM A-197-79
c.	Steel parts	ASTM A108
d.	Bronze parts	ASTM B-16
e.	Zinc parts	ASTM B633-85
 - 2. Dielectric fittings shall be WATTS Series 3000.
- C. Water hammer arrestors: ANSI A112.26.1, ASSE 1010, sized in accordance with PDI WH-201, precharged piston type constructed entirely of stainless steel, threaded brass adapter, brass piston with O-ring seals, FDA approved silicone lubricant, suitable for operation in temperature range 35°F to 150°F maximum 150 psig working pressure, 1500 psig surge pressure. J. R. Smith Series 5000.

PART 3 - EXECUTION

3.1 pipe installation

- A. Joints in copper tubing shall be made by first thoroughly cleaning the surface of the pipe and fittings, applying flux and sweating with 95-5 tin Antimony "soft-solder."
- B. Pipe shall be carefully cleaned before installation. The ends of threaded pipe shall be reamed out full size with a long taper reamer so as to be partially bell-mouthed and perfectly smooth.
- C. Flush out all water mains with water so as to obtain free flow. Remove all obstructions and defects discovered. Remove and re-lay any sections and pipe already laid and found to be defective or which has had grade or joints disturbed.
- D. Openings in pipes, drains, fittings, apparatus and equipment shall be kept covered or plugged to prevent foreign substance from entering.
- E. Run piping free of traps, sags, or bends. Grade and valve for complete drainage and control of the system.
- F. All piping to be run to maintain headroom and keep passageways and openings clear. Run parallel and straight with adjacent walls or ceilings to present a uniform appearance.
- G. All piping, except where noted otherwise on plans, shall be concealed in walls or above ceilings.
- H. Bending or forcing of pipe will not be allowed. Use fittings for all offsets or changes in alignment of piping.
- I. Proper provision shall be made for expansion and contraction by means of fittings and anchors and supports of all piping.
- J. Street elbows, bushings and long screw fittings will not be allowed.
- K. All piping shall be isolated from dissimilar metals, other piping, any part of the building, framing, conduit, supports etc., with Elmdor/Stoneman Series 500 trisolator or approved equal.
- L. PDI sized water hammer arresters shall be installed at the end of the branch line between the last two self-closing water faucet / flush valve fixtures served. When the branch line exceeds 20'-0" in length, an additional water hammer arrester shall be installed.
- M. Unions shall be installed after each screw-type valve, connections for all equipment, appliances and as required for erection and maintenance. No unions shall be installed in a concealed location.
- N. Install isolation unions on all connections between dissimilar metals (galvanized steel, black steel to copper).

END OF SECTION 221100

SECTION 221300 Sanitary Waste, Vent, and Specialties

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Work included shall be as indicated on the drawings, including but not limited to the following:
 - 1. Sanitary Waste Piping
 - 2. Storm Dain Piping
 - 3. Pipe Fittings

PART 2 - PRODUCTS

2.1 FITTINGS AND PIPING

- A. Soil, Waste, Storm Drain and Vent Above and Below Grade Within 5' of Building Line: No hub service weight cast iron soil pipe and fittings conforming to the latest issue of CISPI 301, ASTM A-888. Pipe and fittings shall be GreenSpec listed. Manufacturer shall be Charlotte, Tyler, AB&I, or approved equal.
- B. Joints: Joints for hubless pipe and fittings shall conform to the manufacturer's installation instructions and local code requirements. Hubless couplings shall be composed of a heavy duty four or six band coupling, stainless steel shield / clamp assembly and a fire resistant neoprene gasket conforming to ASTM C1540, CISPI 310, Factory Mutual 1680 Class 1, and bear the NSF trademark, manufactured by Anaco Husky SD4000, Fernco, MiFab or approved equal. Joints for hub and spigot shall be installed with compression gaskets conforming to the requirements of ASTM C-564, or shall be installed with lead and oakum.
- C. Sewer from 5' outside building except as otherwise noted on plans; Schedule 40 PVC piping conforming to ASTM D 2665, fittings conforming to ASTM D 2466 with solvent welded joints conforming to ASTM D2564.
- D. Vent Piping: Service weight cast-iron with same joint as used for soil and waste above grade.

2.2 CLEANOUTS

- A. Wall Cleanouts: J.R. Smith Fig. 4472, or approved equal, series countersunk plug with chrome plated cover and screws.

PART 3 - EXECUTION

3.1 pipe installation

- A. No-Hub cast-iron Soil Pipe Institute Pamphlet #100 and the I.A.P.M.O. IS-6-75.
- B. All sanitary sewers and waste lines shall grade as indicated on drawings. The sections of the pipe shall be laid and fitted so that when completed the pipe will have smooth and uniform invert. Water shall not be allowed in the trenches while the pipes are being laid. Dirt, cement, or any other superfluous material of any description shall be carefully removed from the interior of the piping system as the work progresses. Constant inspection shall be made in pipe and fittings during and after all installation for possible fractures and failures caused by installation. Backfill so as not to disturb pipe or jointing.
- C. Flush out all sanitary drains with water so as to obtain free flow. Remove all obstructions and defects discovered. Remove and re-lay any sections and pipe already laid and found to be defective or which has had grade or joints disturbed.
- D. Openings in pipes, drains, fittings, apparatus and equipment shall be kept covered or plugged to prevent foreign substance from entering.
- E. Run piping free of traps, sags, or bends. Grade and valve for complete drainage and control of the system.
- F. All piping to be run to maintain headroom and keep passageways and openings clear. Run parallel and straight with adjacent walls or ceilings to present a uniform appearance.
- G. All piping, except where noted otherwise on plans, shall be concealed in walls or above ceilings.
- H. Bending or forcing of pipe will not be allowed. Use fittings for all offsets or changes in alignment of piping.

3.2 CLEANOUTS

- A. As specified (see plans for size), cleanouts shall be caulked into pipe where shown on plans under countertops where they occur in walls to avoid their being too conspicuous. Cleanouts shall be accessible in all cases and shall be brought to surface on "Y" branches. All cleanouts shall be provided with removable floor or wall plate as herein specified.
- B. In addition to the cleanouts shown on the plans, install cleanouts in all horizontal lines at each aggregate change of direction exceeding 135°, and at the base of any vertical riser longer than 8'-0". Install cleanout outside the building at the lower end of the building drain and extend to grade.

END OF SECTION 221300

SECTION 224000 plumbing fixtures

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Work included shall be as indicated on the drawings, including but not limited to the following:
 - 1. Plumbing Fixtures
 - 2. Fixture Supports

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES

- A. Plumbing fixtures shall be as shown in equipment schedule.
- B. Reference is made to American Standard, it is understood to mean that equivalent fixtures as manufactured by Toto or Kohler, are acceptable if used throughout. Faucets by Symmons, equivalents by Moen, or approved equal, are acceptable. Equivalent toilet seats by Beneke, Olsonite, or approved equal, are acceptable. Equivalent carrier, floor drains, etc. by J.R. Smith, Josam, Wade, Zurn, or approved equal, are acceptable.
- C. All sinks shall have a clean-out.

PART 3 - EXECUTION

3.1 FIXTURE INSTALLATION

- A. All plumbing fixtures shall be bedded and caulked along joint at walls, countertops, and other intersecting surfaces with Vulkem white silicone, use clear at stainless steel fixtures.
- B. Plumbing fixture trim and exposed supplies and waste shall be brass with polished chrome plated finish. Individual loose key stops, or, so specified, screw driver stops, shall be provided for all supplies, and unless integral with valves or faucets, unless otherwise approved by Architect, shall be mounted under the fixture. Exposed supplies and wastes through walls shall be provided with polished chrome plated cast brass wall escutcheons.
- C. Fixtures with hangers or supporting arms shall have hangers or arms securely mounted on a 1/4" thick x 6" wide steel wall plate which shall extend at least one stud beyond the first and last fixture mounting points. Concealed arm assemblies shall be attached to plates by four 3/8" x 1-1/4" steel bolts and nuts, and hangers and exposed arms by 5/16"

minimum full thread steel studs and jamb nuts. Plates shall be drilled and tapped at the time of fixture installation.

- D. Wall plates shall be recessed flush with studs and shall be securely attached to each stud crossed. In steel stud construction, a 1-1/2" x 18" long furring channel shall be attached to each notched stud with fillet welds 1" long on 6" centers front and back. Plates shall be continuous fillet welded at both top and bottom to each furring channel.

END OF SECTION 224000

SECTION 230500 - COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SCOPE

- A. The work under this Section includes everything necessary for and incidental to executing and completing the Heating, Ventilating and Air Conditioning work, except as hereinafter specifically excluded.

1.3 SUBMITTALS

- A. Submit a minimum of six copies of shop drawings for all products. All submittal sheets shall be clearly marked or highlighted showing conformance to specifications and schedule. All submittals shall be crossed referenced to the requirements of each specification paragraph pertaining to the item being submitted. All requirements must be shown on manufacturer's literature. Manufacturer's representative's letterhead, or super-imposed notations, are not acceptable. This requirement pertains to all sections of Division 230000. No exceptions. Submittals not so marked will be subject to rejection.
- B. The contractor shall assume any extra costs to other work or trades resulting from the use of substitutions. All substitutions shall be supplied as approved at no extra charge.

1.4 RELATED WORK NOT IN THIS SECTION

- A. Painting, except as hereinafter specified.
- B. Division 26 will provide all line voltage wiring, disconnects, magnetic starters except those furnished under this section as part of packaged equipment, manual starters, and connect up all motors complete.

1.5 DELIVERY AND STORAGE OF MATERIALS

- A. Provide for the safety and good condition of all materials and equipment until final acceptance by the Architect. Protect all materials and equipment from damage from any cause whatever, and provide adequate and proper storage facilities during the progress of the work. Replace all damaged and defective work precedent to filing application for final acceptance.

1.6 CODES AND STANDARDS

- A. All work and materials shall be in full accordance with Title 24 CCR and the latest rules and regulations of the State Fire Marshall; the Safety Orders of the Division of Industrial Safety; the National Electric Code; the California Plumbing Code; Local Building Codes; the California Mechanical Code; Vol. II of the California Building Code; CCR T-24; and other applicable codes, laws or regulations of bodies lawfully empowered and having jurisdiction over this project. Nothing in the plans or specifications is to be construed to permit work not conforming to these codes.
- B. This Contractor shall obtain all permits, patent rights, and licenses that are required for the performing of his work by all laws, ordinances, rules and regulations or orders of any officer and/or body, shall give all notices necessary in connection therewith, and pay all fees relating thereto and all costs and expenses incurred on account thereof. No work shall be covered before inspection by the jurisdictional inspection and the Architect.

1.7 SEISMIC ANCHORAGE AND BRACING

- A. All equipment and ductwork shall be anchored or braced in accordance with the California Building Code. The contractor is responsible for providing anchorage or bracing for all equipment regardless of whether detailed or shown on the plans. All equipment and ductwork supports not detailed or shown on the plans requires approval of a registered Structural Engineer.
- B. All equipment and ductwork shall be supported or braced in accordance with the SMACNA "Seismic Restraint Manual: Guideline for Mechanical Systems" latest edition, B-Line/TOLCO "Seismic Bracing and Support Systems", OSHPD #OPM-0052-13, or Mason Industries "Seismic Restraint Components for Suspended Utilities", OSHPD #OPM-0043-13. If the duct size exceeds the size included in these manuals, custom designed supports are required. All custom supports require the approval of a registered Structural Engineer. All shop drawings and calculations shall be submitted prior to fabrication.
- C. All flexibly mounted equipment shall be provided with seismic vibration isolation devices designed in accordance with the California Building Code. All anchors and equipment connections shall be submitted. All seismic vibration isolation devices shall be submitted with structural calculations signed by a Registered Structural Engineer in the State of California.

1.8 CUTTING AND PATCHING

- A. Perform all cutting and fitting required for work of this section in rough construction of the building.
- B. All patching of finished construction of building shall be performed under the sections of specifications covering these materials.
- C. Openings through fire rated walls for pipes and ducts shall be packed with impervious noncombustible materials to provide a tight fit. All duct penetrations through fire rated walls shall have a fire smoke damper with smoke detector and access panel.

1.9 GENERAL

- A. Unless otherwise specified herein, all equipment and fixtures shall be installed in accordance with the manufacturer's recommendations.
- B. Before submitting his bid, the Contractor for the work under this section shall carefully study all drawings, and shall make a careful examination of the premises. He shall definitely determine in advance, the methods of installing and connecting the apparatus, the means to be provided for getting any equipment into place, and shall make himself thoroughly familiar with all the requirements of the contract. After award of the contract, no subsequent allowances will be made to the Contractor due to his failure to comply with the above requirements and any other conditions affecting the installation and completion of all work.
- C. Workmanship: All labor shall be carefully skilled for this kind of work, thorough and first class in all respects and under the direction of a competent foreman.

1.10 DAMAGE BY LEAKS

- A. This Contractor shall be responsible for damage to the grounds, walks, roads, buildings, piping systems, electrical systems and their equipment and contents, caused by leaks in the piping systems being installed or having been installed herein. He shall repair at his expense all damage so caused. All repair work shall be done as directed by the Architect.

1.11 EMERGENCY REPAIRS

- A. The Owner reserves the right to make emergency repairs as required to keep equipment in operation without voiding the Contractor's guarantee bond nor relieving the Contractor of his responsibilities.

1.12 EXPLANATION AND PRECEDENCE OF DRAWINGS

- A. For purposes of clearness and legibility, drawings are essentially diagrammatic, and, although size and location of equipment are drawn to scale wherever possible, Contractor shall make use of all data in all the contract documents and shall verify this information at building site.

- B. The drawings indicate required size and points of termination of ducts, and suggest proper routes to conform to structure, avoid obstructions and preserve clearances. However, it is not intended that drawings indicate all necessary offsets, and it shall be the work of the Contractor to make the installation in such a manner as to conform to structure, avoid obstructions, preserve headroom and keep openings and passageways clear, without further instructions or cost to the Owner.
- C. Shop drawings shall be furnished indicating all changes to meet space requirements, code requirements and as necessary to resolve all space conflicts.
- D. It is intended that all apparatus be located symmetrically with architectural elements. Refer to architectural details in completing the correlating work.
- E. The Contractor shall fully inform himself regarding any and all peculiarities and limitations of the spaces available for the installation of all work and materials furnished and installed under the Contract. He shall exercise due and particular caution to determine that all parts of his work are made quickly and easily accessible.
- F. The Contractor shall study all drawings and specifications to determine any conflict with ordinances and statutes. Any errors or omissions shall be reported, and any changes shall be shown in the as-built drawings and the additional work performed at no cost to the Owner.
- G. Submittal of bid shall indicate the Contractor has examined the site and drawings and has included all required allowances in his bid. No allowance shall be made for any error resulting from Contractor's failure to visit job site and to review drawings, and bid shall include costs for all required drawings and changes as outlined above, all at no cost to Owner.

1.13 SUPERVISION AND COOPERATION

- A. This Contractor shall include the services of experienced superintendents for each sub-section who shall be constantly in charge of the work, together with the qualified journeymen, helpers and laborers, required to properly unload, install, connect, adjust, start and operate and test the work involved, including equipment and materials furnished by others and by the Owner.
- B. The work under this section shall be in cooperation with the work of other trades to prevent conflict or interference and to aid rapid completion of the overall project.

1.14 OPERATION

- A. The Owner may require operation of parts or all of the installation for beneficial occupancy prior to final acceptance. Refer to General Conditions of the Contract.
- B. Cost of utilities for such operation shall be paid by the Owner. Said operation shall not be construed as acceptance of the work.

1.15 ELECTRICAL

- A. When electrical work is specified in previous or subsequent sections to be furnished and installed by Division 23, it shall be installed in metallic conduit and in full accordance with the California Electrical Code and the State of California Industrial Accident Commission's Safety Orders. Conduit shall be installed in accordance with the Electrical Division of these Specifications.
- B. The line voltage wiring shown on the Electrical Drawings is based on the control diagram, control specifications and specified items as outlined herein. Any changes necessary to accommodate the controls and specified items furnished which increase the cost for line voltage wiring shall be paid for by the Contractor.
- C. Before order is placed for motors or other electrical devices, the Contractor shall check with Division 26 plans and specifications, and verify requirements as to type, mounting and current characteristics as well as to any special delivery instructions.
- D. This Contractor shall furnish, install and/or align all motors for driving the equipment furnished and installed by this contract. Motors shall be designed to operate at full load continuously without exceeding a temperature rise of 40°C. The size of all motors shall be the size required by equipment it drives.
- E. Motors shall be fitted with base and slide rails. Motors shall be Westinghouse, General Electric, Fairbanks Morse, Wagner, Allis Chalmers, or Sterling. Each motor shall have a sufficient starting torque to start the apparatus drive. All motors shall be wound for the voltage shown in the schedule on the drawings.
- F. Each motor for a belt drive shall be fitted with adjustable "V" belt sheaves. These shall be key seated and set screwed to the motor shafts and the combined motor and sheave shall run in perfect balance.
- G. All motors less than 1/2 HP shall have built-in running thermal overload protection. Motors 1/2 HP and larger, shall be rated for 3-phase service unless otherwise noted.
- H. All motors installed exposed to the weather, shall be totally enclosed and weatherproof.
- I. All motors 3 horsepower and larger, shall be energy efficient type in compliance with NEMA Energy Efficiency Standards, and qualify for local utility rebates, Centry E, or approved equal. Submittals shall show efficiency and power factor at 100% load.
- J. Starters: All individual motor starters will be furnished under the Electrical Section of the specifications, unless noted otherwise. For starters to be furnished under this section, see Control Diagram on the drawings and Equipment Section of the specifications.

1.16 UTILITY SERVICES DURING CONSTRUCTION

- A. All water and electric power used for construction shall be paid for by the Contractor.

1.17 ACCESS PANELS

- A. Access Doors and Panels: Wherever volume dampers, fire dampers, controls or other items or parts of the installation which require periodic inspection or adjustment are concealed by permanent non-removable construction, an access door shall be provided. Door shall be manufactured by Elmdor, Potter Roemer, or approved equal with slotted, hand-operated cam locks. Types to be as approved and as appropriate for the surface and construction in which it is installed. Furnishing and locating of access panels by Division 23, installation by others; verify all locations with Architect.

1.18 COORDINATION

- A. Coordinate layout and installation of Ductwork, Equipment, Hydronic piping and suspension system components with other construction, including light fixtures, HVAC equipment, electrical conduit, fire suppression system components, and partition assemblies.
- B. Coordinate pipe sleeve installations for foundations wall penetrations.
- C. Coordinate installation of pipe sleeves for penetrations through exterior walls and floor assemblies.

PART 2 - PRODUCTS

- 2.1 Not used.

PART 3 - EXECUTION

3.1 REQUIREMENTS FOR ACCEPTANCE INSPECTION

- A. All of the following items must be completed prior to final inspections. No exceptions will be made and no final payment will be made until all items are completed.
- B. Cleaning Equipment and Premises:
 - 1. Thoroughly clean all parts of the registers, grilles, and equipment. Exposed parts which are to be painted shall be thoroughly cleaned of cement, plaster and other materials and all oil and grease spots shall be removed. Such surfaces shall be carefully wiped and all cracks and corners scraped out.
 - 2. Exposed metal work shall be carefully brushed down with steel brushes to remove rust and other spots left smooth and clean.
 - 3. Electrical device covers shall not be installed until finish coat of paint is completed. Device handles and receptacles shall be covered and/or protected during the painting operation to preserve the original factory bright new finish.
- C. Operating Instruction and Service Manual: The Contractor shall carefully prepare three (3) operating instruction and service manuals for the entire system including all equipment, except Owner-furnished equipment. They shall be submitted for approval immediately upon

completion of the work. Failure to submit for approval will delay final inspection and acceptance of the work by the Architect.

1. The following items together with any other necessary pertinent data shall be included in the manual. This is not complete and is to be used as a guide:
 - a. Manufacturer's Literature: Copy of manufacturer's instructions for operation and maintenance of all mechanical equipment, including replacement parts, lists and drawings. These brochures and any other required operating and service instructions shall be submitted to the Architect. The Contractor shall mark brochure literature indicating the model, sizes, capacities, curve operating points, etc., in a manner to clearly indicate the equipment installed. The Contractor shall remove all pages or sheets from the bulletins and catalogs that do not pertain to equipment installed on the project.
 - b. Maintenance schedule and instructions
 - c. Oiling, lubrication and greasing data.
 - d. Complete electrical load data from operation test.
 - e. Test data on all equipment.
 - f. Belt sizes, types and lengths.
 - g. Serial numbers of all principal pieces of equipment.
 - h. Manufacturer's suppliers and subcontractors names and addresses and phone numbers.
 - i. Control diagram and written sequence of operation.
 - j. Written guarantee.
 - k. As-builts corrected and completed to date.
- D. Written Instructions: Typewritten instructions of operation and maintenance of the system composed of operating instructions, maintenance instructions and a maintenance schedule.
- E. Operating instructions shall contain a brief description of the system. Adjustments requiring the technical knowledge of the service agency personnel shall not be included in the operating instructions. The fact such adjustments are required, however, shall be noted.
- F. Maintenance instructions shall list each item of equipment requiring inspection, lubrication or service and describe the performance of such maintenance.
- G. Maintenance schedule shall list each item of equipment, shall show the exact type of bearing on every component of each item of equipment, and shall show when each item of equipment should be inspected or serviced.

3.2 IDENTIFICATION OF PIPING AND EQUIPMENT

- A. Equipment: Identify all mechanical equipment with nameplate bearing equipment name and number, and area / space served by equipment using 1-1/2" white Bakelite with 1/2" black letters permanently mounted by screws in a conspicuous place. All mechanical equipment shall be provided with a permanently affixed factory nameplate containing the model, manufacturer name, capacity, electrical data and serial number. Impeller size shall be included on pump information. Nameplate shall be engraved aluminum.

3.3 DRAWINGS OF RECORD

- A. Record of Project Progress: Maintain a complete set of reproducible contract drawings available at the job site for inspection. Keep an accurate, legible and continuously updated record of installed locations and all project revisions other than revised drawings issued by the Architect, including source and date of authorization. Utilize only contract drawing symbols for recording the work. Drawing notations to be sufficiently clear in the representation of work, for utilization by a CADD operator (drafts person) who is not necessarily familiar with the installed work.
- B. Record of Installation: At the conclusion of the work, Contractor shall deliver one (1) set of signed prints of the progress drawings to the owner's representative for review. Following the review, Contractor shall have incorporated by a competent CADD operator all of the installed data represented on the project progress drawings. If Revit was used to produce the project drawings, Architect shall provide a copy of the Revit model to the contractor for updating progress drawings.
- C. Include in Record Drawings the Following:
 - 1. Revisions, including sketches, bulletins, change orders, written addends and directives, clarifications and responses generated by requests for information (RFI's), regardless of source of the revision.
 - 2. Location and configuration of equipment with related housekeeping pads.
 - 3. Physical routing of ductwork, exposed, and above ceilings with locations of fire/smoke dampers, smoke detectors, diffusers, registers. Air terminal units, appurtenances, etc., plainly marked and identified.
 - 4. Location of room thermostats, humidistats and sensors.
 - 5. Physical routing of piping, underground, exposed and above ceiling with locations of valves and accessories plainly marked and identified.
 - 6. Location of piping below building and on exterior, valves, appurtenances, etc. Include all sewer / waste and storm drain piping invert elevations.
- E. Acceptance: As a condition of acceptance of work, deliver one (1) set of AutoCad (Revit) latest version CD and one (1) set of signed and dated reproducible drawings to owner's representative and obtain receipt.

3.4 GUARANTEE

- A. All work under this section shall be guaranteed in writing in accordance with the General Provisions.
- B. The Contractor shall and hereby does warrant that:
 - 1. All material except as otherwise noted shall be new, free from defect and of the quality and rating shown or specified.
 - 2. Any defect due to missing or improper material or faulty workmanship existing or developing during the warranty period shall be corrected and the resulting damage repaired without additional cost to the Owner.
 - 3. The warranty period shall be one year from date of acceptance of the project.

3.5 ADDITIONAL WORK

- A. Design is based on equipment as described in the Drawings Equipment Schedule. Any change in foundation bases, electrical wiring, conduit, connections, piping, controls, and openings required by alternate equipment specified and submitted and approved shall be paid for by this Contractor.

END OF SECTION 230500

SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Equipment labels.
 2. Duct labels.

1.2 SUBMITTAL

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

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

- A. Plastic Labels for Equipment:
1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
 2. Letter Color: White.
 3. Background Color: Black.
 4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 7. Fasteners: Stainless-steel self-tapping screws.
 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.
- C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 DUCT LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- B. Letter Color: Blue.
- C. Background Color: White.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- G. Fasteners: Stainless-steel rivets or self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2 inches high.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.3 DUCT LABEL INSTALLATION

- A. Install self-adhesive duct labels with permanent adhesive on air ducts in the following color codes:

1. Blue: For cold-air supply ducts.
 2. Yellow: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
 3. ASME A13.1 Colors and Designs: For hazardous material exhaust.
- B. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

END OF SECTION 230553

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes TAB to produce design objectives for the following:
 - 1. Air Systems:
 - a. Constant-volume air systems.
 - 2. HVAC equipment quantitative performance settings.
 - 3. Reporting results of activities and procedures specified in this Section.

1.2 SUBMITTALS

- A. Strategies and Procedures Plan: Within 30 days from Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in Part 3 "Preparation" Article. Include a complete set of report forms intended for use on this Project.
- B. Certified TAB Reports: Submit two copies of reports prepared, as specified in this Section, on approved forms certified by TAB firm.
- C. Warranties specified in this Section.

1.3 QUALITY ASSURANCE

- A. TAB Firm Qualifications: Engage a TAB firm certified by AABC, NEBB or TABB.
- B. Certification of TAB Reports: Certify TAB field data reports. This certification includes the following:
 - 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 - 2. Certify that TAB team complied with approved TAB plan and the procedures specified and referenced in this Specification.
- C. TAB Report Forms: Use standard forms from AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" or SMACNA's TABB "HVAC Systems - Testing, Adjusting, and Balancing".

1.4 PROJECT CONDITIONS

- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.5 COORDINATION

- A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist TAB activities.
- B. Perform TAB after leakage and pressure tests on air distribution systems have been satisfactorily completed.

1.6 WARRANTY

- A. National Project Performance Guarantee: Provide a guarantee on AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" forms stating that AABC will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents. Guarantee includes the following provisions:
 - 1. The certified TAB firm has tested and balanced systems according to the Contract Documents.
 - 2. Systems are balanced to optimum performance capabilities within design and installation limits.
- B. Special Guarantee: Provide a guarantee on NEBB forms stating that NEBB will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents. Guarantee shall include the following provisions:
 - 1. The certified TAB firm has tested and balanced systems according to the Contract Documents.
 - 2. Systems are balanced to optimum performance capabilities within design and installation limits.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
 - 1. Verify that balancing devices, such as flow control devices, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these

balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.

- B. Examine approved submittal data of HVAC systems and equipment.
- C. Examine Project Record Documents described in Division 01 Section "Project Record Documents."
- D. Examine design data, including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine equipment performance data including fan and pump curves. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system. Calculate system effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from those presented when the equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with the design data and installed conditions.
- F. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Sections have been performed.
- G. Examine system and equipment test reports.
- H. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as flow control devices, and manual volume dampers, are properly installed, and that their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- I. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.
- J. Examine HVAC equipment to ensure that clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- K. Examine plenum ceilings used for supply air to verify that they are airtight. Verify that pipe penetrations and other holes are sealed.
- L. Examine equipment for installation and for properly operating safety interlocks and controls.
- M. Examine automatic temperature system components to verify the following:
 - 1. Dampers, and other controlled devices are operated by the intended controller.
 - 2. Dampers are in the position indicated by the controller.
 - 3. Integrity of dampers for free and full operation and for tightness of fully closed and fully open positions.
 - 4. Thermostats are located to avoid adverse effects of sunlight, drafts, and cold walls.
 - 5. Sensors are located to sense only the intended conditions.
 - 6. Sequence of operation for control modes is according to the Contract Documents.

7. Controller set points are set at indicated values.
 8. Interlocked systems are operating.
 9. Changeover from heating to cooling mode occurs according to indicated values.
- N. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system readiness checks and prepare system readiness reports. Verify the following:
 1. Permanent electrical power wiring is complete.
 2. Automatic temperature control systems are operational.
 3. Equipment and duct access doors are securely closed.
 4. Balance dampers are open.
 5. Ceilings are installed in critical areas where air pattern adjustments are required and access to balancing devices is provided.
 6. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems", NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems", SMACNA's TABB "HVAC Systems - Testing, Adjusting, and Balancing" and this Section.
- B. Cut insulation, ducts, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to insulation Specifications for this Project.
- C. Mark equipment and balancing device settings with paint or other suitable, permanent identification material, including damper control positions, fan speed control levers, and similar controls and devices, to show final settings.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. Determine the best locations in main and branch ducts for accurate duct airflow measurements.

- D. Check airflow patterns from the outside air louvers and dampers and the return and exhaust air dampers, through the supply fan discharge and mixing dampers.
- E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- F. Verify that motor starters are equipped with properly sized thermal protection.
- G. Check dampers for proper position to achieve desired airflow path.
- H. Check for airflow blockages.
- I. Check for proper sealing of air handling unit components.
- J. Check for proper sealing of air duct system.

3.5 PROCEDURES FOR CONSTANT VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure fan static pressures to determine actual static pressure as follows:
 - a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single inlet fans in the inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.
 - d. Measure inlet static pressure of double inlet fans through the wall of the plenum that houses the fan.
 - 2. Measure static pressure across each component that makes up an air handling unit, rooftop unit, and other air handling equipment.
 - a. Simulate dirty filter operation and record the point at which maintenance personnel must change filters.
 - 3. Compare design data with installed conditions to determine variations in design static pressures versus actual static pressures. Compare actual system effect factors with calculated system effect factors to identify where variations occur. Recommend corrective action to align design and actual conditions.
 - 4. Obtain approval from Architect for adjustment of fan speed higher or lower than indicated speed. Make required adjustments to pulley sizes, motor sizes, and electrical connections to accommodate fan-speed changes.
 - 5. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full cooling, full heating, economizer, and any other operating modes to determine the maximum required brake horsepower.

- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
 - 1. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.
 - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 - 2. Re-measure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.

3.6 TOLERANCES

- A. Set HVAC system airflow rates within the following tolerances:
 - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus 5 to plus 10 percent.
 - 2. Air Outlets and Inlets: Minus 10 to plus 10 percent.

3.7 FINAL REPORT

- A. General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in three-ring binder, tabulated and divided into sections by tested and balanced systems.
- B. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.
 - 1. Include a list of instruments used for procedures, along with proof of calibration.
- C. Final Report Contents: In addition to certified field report data, include the following:
 - 1. Fan curves.
 - 2. Manufacturers' test data.
 - 3. Field test reports prepared by system and equipment installers.
 - 4. Other information relative to equipment performance, but do not include Shop Drawings and Product Data.
- D. General Report Data: In addition to form titles and entries, include the following data in the final report, as applicable:
 - 1. Title page.
 - 2. Name and address of TAB firm.
 - 3. Project name.
 - 4. Project location.
 - 5. Architect's name and address.
 - 6. Engineer's name and address.
 - 7. Contractor's name and address.
 - 8. Report date.
 - 9. Signature of TAB firm who certifies the report.

10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 12. Nomenclature sheets for each item of equipment.
 13. Notes to explain why certain final data in the body of reports varies from indicated values.
 14. Test conditions for fan performance forms including the following:
 - a. Settings for outside-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Inlet vane settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.
 - h. Other system operating conditions that affect performance.
- E. System Diagrams: Include schematic layouts of air distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outside, supply, return, and exhaust airflows.
 2. Duct, outlet, and inlet sizes.
 3. Position of balancing devices.

3.8 ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional testing, inspecting, and adjusting during near-peak summer and winter conditions.

END OF SECTION 230593

SECTION 233116 NONMETAL DUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. PVC ducts and fittings.

B. Related Sections:

1. Section 23 05 93 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for nonmetal ducts.
2. Section 23 31 13 "Metal Ducts" for single- and double-wall, rectangular and round ducts.
3. Section 23 33 00 "Air Duct Accessories" for dampers, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of the products indicated.

B. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
2. Suspended ceiling components.
3. Structural members to which duct will be attached.
4. Size and location of initial access modules for acoustical tile.
5. Penetrations of smoke barriers and fire-rated construction.
6. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - f. Perimeter moldings.

1.3 QUALITY ASSURANCE

A. NFPA Compliance:

1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."

2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 - PRODUCTS

2.1 PVC DUCTS AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. General Plastics, Inc.
 2. GKP Products, Inc.
 3. Harvel Plastics, Inc.
 4. Kroy Industries, Inc.
 5. Northern Pipe Product, Inc.
 6. Plastinetics, Inc
 7. Spears Manufacturing Company.
- B. Duct and Fittings:
 1. Round Duct: Comply with cell Classification 12454-B in ASTM D 1784, with external loading properties of ASTM D 2412.
 2. Round Fittings: Socket end molded of same material, pressure class, and joining method as duct.
 3. Rectangular Fittings: Minimum 0.125-inch- thick flat sheet with heat-formed corners and continuous welded butt joints.
- C. Joining Materials: PVC solvent cement complying with ASTM D 2564.
 1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Solvent cement and adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Fabrication:
 1. Fabricate joints, seams, transitions, reinforcement, elbows, branch connections, and access doors and panels according to SMACNA's "Thermoplastic Duct (PVC) Construction Manual," Chapter 3, "Standards of Construction for PVC Duct Systems."
 2. Fabricate 90-degree rectangular mitered elbows to include turning vanes, 90-degree round elbows with a minimum of three segments for 12 inches and smaller and a minimum of five segments for 14 inches and larger.
- E. Drains: PVC drain pockets with a minimum of NPS 1 threaded PVC pipe connections.

2.2 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- D. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- E. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

- A. Install ducts with fewest possible joints.
- B. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- C. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- D. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- E. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges. Overlap openings on four sides by at least 1-1/2 inches.
- F. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 23 33 00 "Air Duct Accessories" for fire and smoke dampers.
- G. Protect duct interiors from the moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."
- H. Install PVC ducts and fittings to comply with SMACNA's "Thermoplastic Duct (PVC) Construction Manual."

3.2 HANGER AND SUPPORT INSTALLATION

- A. Install hangers and supports for PVC ducts and fittings to comply with SMACNA's "Thermoplastic Duct (PVC) Construction Manual," Chapter 3, "Standards of Construction for PVC Duct Systems."
- B. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.3 START UP

- A. Air Balance: Comply with requirements in Section 23 05 93 "Testing, Adjusting, and Balancing for HVAC."

END OF SECTION 233116

SECTION 233300 – AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

- A. The General Conditions, Supplementary Conditions, and Division 1, are a part of this section and the contract for this work and apply to this section as fully as if repeated herein.

1.2 SCOPE

- A. The work under this Section includes everything necessary for and incidental to executing and completing the Heating, Ventilating and Air Conditioning work, except as hereinafter specifically excluded.

1.3 WORK INCLUDED

- A. Work included shall be as indicated on the drawings, including but not limited to the following:
- B. Insulation.
 - 1. Dampers

PART 2 - PRODUCTS

2.1 MANUAL DAMPERS

- A. Manual dampers for round ducts shall be constructed per SMACNA Fig. 7-4-C with blades of 20 gauge steel. Provide 2" hand quadrant standoff bracket on all ducts with wrapped insulation. Shafts shall be continuous through damper. Hand quadrant shall be "Durodyne" 3/8" stampline regulator, Model KSR-19, or approved equal, include similar regulator for standoff bracket. Damper kit shall include regulator, round end bearing and square end bearing. Exposed duct shall have concealed style regulator set, "Durodyne" Model 8008, or approved equal. "Jiffy" or "Rapit" dampers will not be accepted.
- B. Manual dampers for rectangular ducts shall be Greenheck MBD-15 opposed blade dampers with 16 gauge galvanized steel blades and locking hand quadrant. Provide

locking hand quadrant with 1-1/2" standoff mounting bracket on all ducts with wrapped insulation.

PART 3 - EXECUTION

3.1 METAL AND DUCTWORK INSTALLATION

- A. All branch take offs, including individual discharge outlets, shall have volume dampers.
- B. All square turn elbows greater than 45° shall have turning vanes and shall be cross-crimped.
- C. All mixing dampers, fire dampers, grilles, etc., shall be thoroughly cleaned and free of dust and debris before and after installation.
- D. All round branch duct take-off connections to rectangular sheet metal duct shall be accomplished using a flared spin-in fitting. Fitting size shall be same size of branch take-off duct.

* * * *

SECTION 233423 – HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

- A. The General Conditions, Supplementary Conditions, and Division 1, are a part of this section and the contract for this work and apply to this section as fully as if repeated herein.

1.2 SCOPE

- A. The work under this Section includes everything necessary for and incidental to executing and completing the Heating, Ventilating and Air Conditioning work, except as hereinafter specifically excluded.

1.3 WORK INCLUDED

- A. Work included shall be as indicated on the drawings, including but not limited to the following:
 - B. Insulation.
 - 1. Roof Ventilators

PART 2 - PRODUCTS

2.1 ROOF EXHAUST FANS

- A. Fan shall be Cooke, Greenheck or approved equal of size and capacity as called for on the drawings.
- B. Motor nominal horsepower rating shall be a minimum of 110% of the fan brake horsepower. Motor shall be wired to approved horsepower rated disconnect switch locate in motor compartment. Fan shall bear AMCA Certified seal for sound and performance.

END OF SECTION 233423

SECTION 260519 - 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. Copper building wire rated 600 V or less.
 - 2. Connectors, splices, and terminations rated 600 V and less.
- B. Related Requirements:
 - 1. Section 260523 "Control-Voltage Electrical Power Cables" for control systems communications cables and Classes 1, 2, and 3 control cables.

1.3 DEFINITIONS

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: Indicate type, use, location, and termination locations.

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.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- 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. Alpha Wire Company.
 2. Cerro Wire LLC.
 3. General Cable Technologies Corporation.
 4. Okonite Company (The).
 5. Southwire Company.
- C. Standards:
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 2. RoHS compliant.
 3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Deliver wire and cable to the site in their original unbroken packages, plainly marked or tagged with UL label, size and insulation type, and manufacturers name.
1. Wire and cable manufactured 12 months or more prior to installation date will not be acceptable.
- E. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- F. Conductor Insulation:
1. Type THWN-2: Comply with UL 83.
 2. Type XHHW-2: Comply with UL 44.

2.2 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

- 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. 3M Electrical Products.
 - 2. Ideal Industries, Inc.
 - 3. ILSCO.
 - 4. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - 5. Thomas & Betts Corporation; A Member of the ABB Group.
- C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.
- D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
 - 1. Material: Copper.
 - 2. Type: One hole with standard barrels.
 - 3. Termination: Compression.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper; stranded for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Stranded for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway .
- B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN/THWN-2, single conductors in raceway.
- C. Exposed Branch Circuits, Including in Crawlspace: Type THHN/THWN-2, single conductors in raceway.
- D. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.
- E. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW-2, single conductors in raceway.

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. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. 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.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- D. Perform tests and inspections.
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test conductors for compliance with requirements.
 - 2. Perform each of the following visual and electrical tests:
 - a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
 - b. Test bolted connections for high resistance using one of the following:
 - 1) A low-resistance ohmmeter.
 - 2) Calibrated torque wrench.
 - 3) Thermographic survey.
 - c. Inspect compression-applied connectors for correct cable match and indentation.
 - d. Inspect for correct identification.
 - e. Inspect cable jacket and condition.
 - f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500-V dc for 300-V rated cable for a one-minute duration.
 - g. Continuity test on each conductor and cable.
 - h. Uniform resistance of parallel conductors.
 - 3. Initial Infrared Scanning: After Substantial Completion, but before Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.
 - a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - b. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- E. Cables will be considered defective if they do not pass tests and inspections.
- F. Prepare test and inspection reports 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.

END OF SECTION 260519

SECTION 260523 - CONTROL-VOLTAGE ELECTRICAL POWER 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. Category 6 balanced twisted pair cable.
 2. Balanced twisted pair cabling hardware.
 3. RS-485 cabling.
 4. Low-voltage control cabling.
 5. Control-circuit conductors.
 6. Identification products.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.
- C. Plenum: A space forming part of the air distribution system to which one or more air ducts are connected. An air duct is a passageway, other than a plenum, for transporting air to or from heating, ventilating, or air-conditioning equipment.
- D. RCDD: Registered Communications Distribution Designer.

1.4 ACTION SUBMITTALS

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

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency, RCDD, layout technician, installation supervisor, and field inspector.
- B. Source quality-control reports.
- C. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Accredited by NETA.
 - 1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- 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. Flame Travel and Smoke Density in Plenums: As determined by testing identical products according to NFPA 262, by a qualified testing agency. Identify products for installation in plenums with appropriate markings of applicable testing agency.
 - 1. Flame Travel Distance: 60 inches or less.
 - 2. Peak Optical Smoke Density: 0.5 or less.
 - 3. Average Optical Smoke Density: 0.15 or less.
- C. Flame Travel and Smoke Density for Riser Cables in Non-Plenum Building Spaces: As determined by testing identical products according to UL 1666.
- D. Flame Travel and Smoke Density for Cables in Non-Riser Applications and Non-Plenum Building Spaces: As determined by testing identical products according to UL 1685.
- E. RoHS compliant.
- F. Deliver wire and cable to the site in their original unbroken packages, plainly marked or tagged with UL label, size and insulation type, and manufacturers name.
 - 1. Wire and cable manufactured 12 months or more prior to installation date will not be acceptable.

2.2 CATEGORY 6 BALANCED TWISTED PAIR CABLE

- A. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 6 cable at frequencies up to 250MHz.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. 3M.
 - 2. AMP NETCONNECT; a TE Connectivity Ltd. company.

3. [Belden CDT Networking Division/NORDX.](#)
4. [CommScope, Inc.](#)
5. [General Cable; General Cable Corporation.](#)
6. [Superior Essex Inc.](#)

- C. Standard: Comply with NEMA WC 66/ICEA S-116-732 and TIA-568-C.2 for Category 6 cables.
- D. Conductors: 100-ohm, 23 AWG solid copper.
- E. Shielding/Screening: Unshielded twisted pairs (UTP).
- F. Cable Rating: Plenum.
- G. Jacket: White thermoplastic.

2.3 BALANCED TWISTED PAIR CABLE HARDWARE

- A. Description: Hardware designed to connect, splice, and terminate balanced twisted pair copper communications cable.
- B. [Manufacturers: Subject to compliance with requirements, provide products by one of the following:](#)
 1. [3M.](#)
 2. [AMP NETCONNECT; a TE Connectivity Ltd. company.](#)
 3. [Belden CDT Networking Division/NORDX.](#)
 4. [CommScope, Inc.](#)
 5. [General Cable; General Cable Corporation.](#)
- C. General Requirements for Balanced Twisted Pair Cable Hardware:
 1. Comply with the performance requirements of Category 6.
 2. Comply with TIA-568-C.2, IDC type, with modules designed for punch-down caps or tools.
 3. Cables shall be terminated with connecting hardware of same category or higher.
- D. Source Limitations: Obtain balanced twisted pair cable hardware from single source from single manufacturer.
- E. 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.
- F. 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.

G. Plugs and Plug Assemblies:

1. Male; eight position; color-coded modular telecommunications connector designed for termination of a single four-pair 100-ohm unshielded or shielded balanced twisted pair cable.
2. Comply with IEC 60603-7-1, IEC 60603-7-2, IEC 60603-7-3, IEC 60603-7-4, and IEC 60603-7.5.
3. Marked to indicate transmission performance.

H. Jacks and Jack Assemblies:

1. Female; eight position; modular; fixed telecommunications connector designed for termination of a single four-pair 100-ohm unshielded or shielded balanced twisted pair cable.
2. Designed to snap-in to a patch panel or faceplate.
3. Standards:
 - a. Category 6, shielded balanced twisted pair cable shall comply with IEC 60603-7.5.
4. Marked to indicate transmission performance.

I. Faceplate:

1. Two port, vertical single-gang faceplates designed to mount to single-gang wall boxes.
2. Plastic Faceplate: High-impact plastic. Coordinate color with Section 262726 "Wiring Devices."
3. For use with snap-in jacks accommodating any combination of balanced twisted pair, optical fiber, and coaxial work area cords.
 - a. Flush mounting jacks, positioning the cord at a 45-degree angle.

J. Legend:

1. Machine printed, in the field, using adhesive-tape label.
2. Snap-in, clear-label covers and machine-printed paper inserts.

2.4 RS-485 CABLE

A. Plenum-Rated Cable: NFPA 70, Type CMP.

1. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned-copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Fluorinated ethylene propylene jacket.
5. Flame Resistance: NFPA 262.

2.5 LOW-VOLTAGE CONTROL CABLE

- A. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.
 - 1. Multi-pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
 - 2. PVC insulation.
 - 3. Unshielded.
 - 4. PVC jacket.
 - 5. Flame Resistance: Comply with NFPA 262.

2.6 CONTROL-CIRCUIT 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. Encore Wire Corporation.
 - 2. General Cable; General Cable Corporation.
 - 3. Service Wire Co.
 - 4. Southwire Company.
- B. Class 1 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway.
- C. Class 2 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway.
- D. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway.

2.7 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test twisted pair cables according to TIA-568-C.2.
- C. Cable will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Test cables on receipt at Project site.

1. Test each pair of twisted pair cable for open and short circuits.

3.2 INSTALLATION OF RACEWAYS AND BOXES

- A. Comply with requirements in Section 260533 "Raceways and Boxes for Electrical Systems" for raceway selection and installation requirements for boxes, conduits, and wireways as supplemented or modified in this Section.
 1. Outlet boxes for cables shall be no smaller than 4 inches square by 2-1/8 inches deep with extension ring sized to bring edge of ring to within 1/8 inch of the finished wall surface.
 2. Flexible metal conduit shall not be used.
- B. Comply with TIA-569-D for pull-box sizing and length of conduit and number of bends between pull points.
- C. Install manufactured conduit sweeps and long-radius elbows if possible.
- D. Raceway Installation in Equipment Rooms:
 1. Position conduit ends adjacent to a corner on backboard if a single piece of plywood is installed, or in the corner of the room if multiple sheets of plywood are installed around perimeter walls of the room.
 2. Secure conduits to backboard if entering the room from overhead.
 3. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Comply with NECA 1.
- B. General Requirements for Cabling:
 1. Comply with TIA-568-C Series of standards.
 2. Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems."
 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 and shall be continuous from terminal to terminal. Do not splice cable between termination, tap, or junction points.
 5. Cables serving a common system may be grouped in a common raceway. Install network cabling and control wiring and cable in separate raceway from power wiring. Do not group conductors from different systems or different voltages.
 6. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Install lacing bars and distribution spools.

8. Do not install bruised, kinked, scored, deformed, or abraded cable. Remove and discard cable if damaged during installation and replace it with new cable.
9. Cold-Weather Installation: Bring cable to room temperature before dereeling. Do not use heat lamps for heating.
10. Pulling Cable: Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Monitor cable pull tensions.
11. Support: Do not allow cables to lie on removable ceiling tiles.
12. Secure: Fasten securely in place with hardware specifically designed and installed so as to not damage cables.
13. Provide strain relief.
14. Keep runs short. Allow extra length for connecting to terminals. Do not bend cables in a radius less than 10 times the cable OD. Use sleeves or grommets to protect cables from vibration at points where they pass around sharp corners and through penetrations.
15. Ground wire shall be copper, and grounding methods shall comply with IEEE C2. Demonstrate ground resistance.

C. Balanced Twisted Pair Cable Installation:

1. Comply with TIA-568-C.2.
2. Do not untwist balanced twisted pair cables more than 1/2 inch at the point of termination to maintain cable geometry.

D. Installation of Control-Circuit Conductors:

1. Install wiring in raceways.
2. Use insulated spade lugs for wire and cable connection to screw terminals.
3. Comply with requirements specified in Section 260533 "Raceways and Boxes for Electrical Systems."

E. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA-569-D recommendations for separating unshielded copper voice and data communications 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 or Circuit Rating Less Than 2 kVA: A minimum of 5 inches.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 12 inches.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 24 inches.
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:

- a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 6 inches.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 12 inches.
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 or Circuit Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 3 inches.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 6 inches.
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or 5 HP and Larger: A minimum of 48 inches.
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.4 REMOVAL OF CONDUCTORS AND CABLES

- A. Remove abandoned conductors and cables. Abandoned conductors and cables are those installed that are not terminated at equipment and are not identified with a tag for future use.

3.5 CONTROL-CIRCUIT CONDUCTORS

- A. 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 GROUNDING

- A. For data communication wiring, comply with TIA-607-B and with BICSI TDMM, "Bonding and Grounding (Earthing)" Chapter.
- B. For low-voltage control wiring and cabling, comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

3.7 IDENTIFICATION

- A. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- B. Identify data and communications system components, wiring, and cabling according to TIA-606-B; label printers shall use label stocks, laminating adhesives, and inks complying with UL 969.
- C. Identify each wire on each end and at each terminal with a number-coded identification tag. Each wire shall have a unique tag.

3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- D. Perform tests and inspections.
- E. Tests and Inspections:
 - 1. Visually inspect cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA-568-C.1.
 - 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 - 3. Test cabling for direct-current loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination, but not after cross-connection.
 - a. Test instruments shall meet or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in its "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in its "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
- F. 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.

G. End-to-end cabling will be considered defective if it does not pass tests and inspections.

H. Prepare test and inspection reports.

END OF SECTION 260523

SECTION 260526 - 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.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For testing agency and testing agency's field supervisor.
- C. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Certified by NETA.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 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. ILSCO.
 4. O-Z/Gedney; a brand of Emerson Industrial Automation.
 5. Thomas & Betts Corporation; A Member of the ABB Group.

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 Conductor: No. 4 or No. 6 AWG, stranded conductor.
 5. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

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. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- C. Bus-Bar Connectors: Compression type, copper or copper alloy for copper bus bar, with two wire terminals.
- D. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.
- E. Cable-to-Cable Connectors: Compression type, copper or copper alloy.
- F. Conduit Hubs: Mechanical type, terminal with threaded hub.
- G. Lay-in Lug Connector: Mechanical type, copper rated for direct burial terminal with set screw.

- H. Signal Reference Grid Clamp: Mechanical type, stamped-steel terminal with hex head screw.
- I. Straps: Solid copper, cast-bronze clamp. Rated for 600 A.
- J. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.
- K. Water Pipe Clamps:
 - 1. Mechanical type, two pieces with stainless-steel bolts.
 - a. Material: Die-cast zinc alloy.
 - b. Listed for direct burial.

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. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Metallic Fences: Comply with requirements of IEEE C2.
 - 1. Grounding Conductor: Bare copper, not less than No. 8 AWG.
 - 2. Gates: Shall be bonded to the grounding conductor with a flexible bonding jumper.
 - 3. Barbed Wire: Strands shall be bonded to the grounding conductor.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
 - 1. Use exothermic welds for all below-grade connections.

- B. 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.

- C. Grounding and Bonding for Piping:
 - 1. Water Piping: Use braided-type bonding jumpers to electrically bypass water meters or dielectric fittings. Connect to pipe with a bolted connector.
 - 2. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

- D. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are 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. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
 - 4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
 - 5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: 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 tests and inspections.

- D. 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.
 - 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.
- E. Grounding system will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.
- G. 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.
- H. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529 - 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. Section Includes:

1. Steel slotted support systems.
2. Nonmetallic slotted support systems.
3. Conduit and cable support devices.
4. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.

- B. Related Requirements:

1. Section 260548.16 "Seismic Controls for Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

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 the following:
 - a. Slotted support systems, hardware, and accessories.
 - b. Clamps.
 - c. Hangers.
 - d. Sockets.
 - e. Eye nuts.
 - f. Fasteners.
 - g. Anchors.
 - h. Saddles.
 - i. Brackets.
2. Include rated capacities and furnished specialties and accessories.

- B. Seismic Qualification Data: Certificates, for hangers and supports for electrical equipment and systems, 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.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Hangers and supports shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 1. The term "withstand" means "the supported equipment and systems will remain in place without separation of any parts when subjected to the seismic forces specified and the supported equipment and systems will be fully operational after the seismic event."
 2. Component Importance Factor: 1.0.
- 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 Rating: Class 1.
 2. Self-extinguishing according to ASTM D 635.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch-diameter holes at a maximum of 8 inches o.c. in at least one surface.
 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. B-line, an Eaton business.
 - b. G-Strut.
 - c. Unistrut; Part of Atkore International.
 2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
 3. Material for Channel, Fittings, and Accessories: Galvanized steel.
 4. Channel Width: Selected for applicable load criteria.
 5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.

- B. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with minimum 13/32-inch-diameter holes at a maximum of 8 inches o.c., in at least one surface.
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. Allied Tube & Conduit; a part of Atkore International.
 - b. B-line, an Eaton business.
 - c. G-Strut.
 2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
 3. Channel Width: 1-5/8 inches.
 4. Fittings and Accessories: Products provided by channel and angle manufacturer and designed for use with those items.
 5. Fitting and Accessory Materials: Same as those for channels and angles, except metal items may be stainless steel.
 6. Rated Strength: Selected to suit applicable load criteria.
 7. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Conduit and Cable Support Devices: Stainless-steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Mechanical-Expansion Anchors: Insert-wedge-type, **stainless** steel, for use in hardened Portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) B-line, an Eaton business.
 - 2) Hilti, Inc.
 - 3) ITW Ramset/Red Head; Illinois Tool Works, Inc.
 2. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
 3. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
 4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 5. Toggle Bolts: Stainless-steel springhead type.
 6. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:
 - 1. NECA 1.
 - 2. NECA 101
 - 3. NECA 102.
 - 4. NECA 105.
 - 5. NECA 111.
- B. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."
- C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as **required by** NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- D. 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.

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.
- 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.
- 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. To Existing Concrete: Expansion anchor fasteners.

5. 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 thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
 6. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
 7. To Light Steel: Sheet metal screws.
 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that comply with seismic-restraint strength and anchorage requirements.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 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.
- B. Touchup: Comply with requirements in Section 099123 "Exterior Painting" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 260533 - 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 and fittings.
 - 2. Nonmetallic conduits and fittings.
 - 3. Metal wireways and auxiliary gutters.
 - 4. Nonmetal wireways and auxiliary gutters.
 - 5. Boxes, enclosures, and cabinets.

1.3 DEFINITIONS

- A. GRC: Galvanized rigid steel conduit.
- B. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

- A. Product Data: For raceways, wireways and fittings, hinged-cover enclosures, and cabinets.

1.5 INFORMATIONAL SUBMITTALS

- A. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

- A. Metal Conduit:

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. Allied Tube & Conduit; a part of Atkore International.
 - b. NEC, Inc.
 - c. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - d. Republic Conduit.
 - e. Thomas & Betts Corporation; A Member of the ABB Group.
 - f. Western Tube and Conduit Corporation.
 - g. Wheatland Tube Company.
2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. GRC: Comply with ANSI C80.1 and UL 6.
4. IMC: Comply with ANSI C80.6 and UL 1242.
5. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
 - a. Comply with NEMA RN 1.
 - b. Coating Thickness: 0.040 inch, minimum.
6. EMT: Comply with ANSI C80.3 and UL 797.
7. FMC: Comply with UL 1; zinc-coated steel.
8. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

B. Metal Fittings:

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. Allied Tube & Conduit; a part of Atkore International.
 - b. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - c. Republic Conduit.
 - d. Thomas & Betts Corporation; A Member of the ABB Group.
 - e. Western Tube and Conduit Corporation.
 - f. Wheatland Tube Company.
2. Comply with NEMA FB 1 and UL 514B.
3. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
4. Fittings, General: Listed and labeled for type of conduit, location, and use.
5. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
6. Fittings for GRC and IMC: threaded type.
7. Fittings for EMT:
 - a. Material: Steel.
 - b. Type: compression.

8. 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.
 9. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
- C. 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. Nonmetallic Conduit:

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. Arco Corporation.
 - b. CANTEX INC.
 - c. Thomas & Betts Corporation; A Member of the ABB Group.
2. Listing and Labeling: Nonmetallic conduit shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. RNC: Type EPC-80-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

B. Nonmetallic Fittings:

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. Arco Corporation.
 - b. CANTEX INC.
 - c. Thomas & Betts Corporation; A Member of the ABB Group.
2. Fittings, General: Listed and labeled for type of conduit, location, and use.
3. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

- 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. [B-line, an Eaton business.](#)
 2. [Hoffman; a brand of Pentair Equipment Protection.](#)
 3. [MonoSystems, Inc.](#)
 4. [Square D.](#)
- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 4 unless otherwise indicated, and sized according to NFPA 70.
1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Screw-cover type unless otherwise indicated.
- E. Finish: Manufacturer's standard enamel finish.

2.4 NONMETALLIC WIREWAYS AND AUXILIARY GUTTERS

- 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 Moulded Products, Inc.](#)
 2. [Hoffman; a brand of Pentair Equipment Protection.](#)
 3. [Lamson & Sessions.](#)
 4. [Niedax Inc.](#)
- B. Listing and Labeling: Nonmetallic wireways and auxiliary gutters shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Description: Fiberglass polyester, extruded and fabricated to required size and shape, without holes or knockouts. Cover shall be gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections shall be flanged and have stainless-steel screws and oil-resistant gaskets.
- D. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings shall match and mate with wireways as required for complete system.
- E. Solvents and Adhesives: As recommended by conduit manufacturer.

2.5 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. Adalet.
 2. Crouse-Hinds, an Eaton business.
 3. EGS/Appleton Electric.
 4. Hoffman; a brand of Pentair Equipment Protection.
 5. Milbank Manufacturing Co.
 6. O-Z/Gedney; a brand of Emerson Industrial Automation.
 7. RACO; Hubbell.
 8. Thomas & Betts Corporation; A Member of the ABB Group.
- 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 UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.
- G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- H. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- I. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.
- J. Gangable boxes are prohibited.
- K. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 4 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: Fiberglass.
 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- L. Cabinets:
1. NEMA 250, Type 12 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.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
 1. Exposed Conduit: GRC.
 2. Boxes and Enclosures, Aboveground: NEMA 250, Type 4.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
 1. Exposed, Not Subject to Physical Damage: EMT.
 2. Exposed, Subject to Physical Damage, not damp or wet: GRC.
 3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 4. Damp or Wet Locations: RNC. Raceway locations include the following:
 - a. Pump room.
 5. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 nonmetallic in damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch 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 FB 2.10.
 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, steel fittings. Comply with NEMA FB 2.10.
 4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Do not install aluminum conduits, boxes, or fittings.
- F. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- B. 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.
- C. Do not install raceways or electrical items on any rotating equipment.
- D. Do not fasten conduits onto the bottom side of a metal deck roof.
- E. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- F. Complete raceway installation before starting conductor installation.
- G. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- H. 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 of changes in direction.
- I. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
- J. Conceal conduit within walls and ceilings in finished areas unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- K. Support conduit within 12 inches of enclosures to which attached.
- L. 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.
- M. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- N. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- O. 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 trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

- P. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- Q. 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.
- R. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- S. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- T. 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.
- U. 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. Conduit extending from interior to exterior of building.
 - 4. Conduit extending into pressurized duct and equipment.
 - 5. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
 - 6. Where otherwise required by NFPA 70.
- V. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- W. Expansion-Joint Fittings:
 - 1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
 - 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 temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F 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 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 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.
- X. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 36 inches of flexible conduit for 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 in damp or wet locations not subject to severe physical damage.
- Y. 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.
- Z. Locate boxes so that cover or plate will not span different building finishes.
- AA. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- 3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS
- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."
- 3.4 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 260533

SECTION 260544 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND 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. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
 - 2. Grout.
 - 3. Silicone sealants.

1.3 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

2.2 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.3 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
 - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.
 - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
 - 5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
 - 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

END OF SECTION 260544

SECTION 260548.16 - SEISMIC CONTROLS 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. Restraint channel bracings.
2. Seismic-restraint accessories.
3. Mechanical anchor bolts.

- B. Related Requirements:

1. Section 260529 "Hangers and Supports for Electrical Systems" for commonly used electrical supports and installation requirements.

1.3 ACTION SUBMITTALS

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

1. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.
 - a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
 - b. Annotate to indicate application of each product submitted and compliance with requirements.

- B. Delegated-Design Submittal: For each seismic-restraint device.

1. Include design calculations and details for selecting seismic restraints complying with performance requirements, design criteria, and analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
2. Design Calculations: Calculate static and dynamic loading caused by equipment weight, operation, and seismic forces required to select seismic restraints and for designing vibration isolation bases.

- a. Coordinate design calculations with wind load calculations required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.

3. Seismic-Restraint Details:

- a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
- b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
- c. Coordinate seismic-restraint and vibration isolation details with wind-restraint details required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.
- d. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated and that is acceptable to authorities having jurisdiction.
- B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- C. Seismic-restraint devices shall have horizontal and vertical load testing and analysis. They shall bear anchorage preapproval from OSHPD in addition to preapproval, showing maximum seismic-restraint ratings, by ICC-ES or another agency acceptable to authorities having jurisdiction. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) that support seismic-restraint designs must be signed and sealed by a qualified professional engineer.
- D. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic-Restraint Loading:

1. Site Class as Defined in the IBC: D.
2. Assigned Seismic Use Group or Building Category as Defined in the IBC: II.
 - a. Component Importance Factor: 1.0.
 - b. Component Response Modification Factor: As applicable per ASCE 7-10.
 - c. Component Amplification Factor: As applicable per ASCE 7-10.
3. Design Spectral Response Acceleration at Short Periods (0.2 Second): 1.142
4. Design Spectral Response Acceleration at 1.0-Second Period: 0.439

2.2 RESTRAINT CHANNEL BRACINGS

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. B-line, an Eaton business.
2. Hilti, Inc.
3. Mason Industries, Inc.
4. Unistrut; Part of Atkore International.

B. Description: MFMA-4, shop- or field-fabricated bracing assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end, with other matching components, and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

2.3 RESTRAINT 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. Gripple Inc.
2. Kinetics Noise Control, Inc.
3. Vibration & Seismic Technologies, LLC.
4. Vibration Mountings & Controls, Inc.

B. Restraint Cables: ASTM A 492 stainless-steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; with a minimum of two clamping bolts for cable engagement.

2.4 SEISMIC-RESTRAINT 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. B-line, an Eaton business.
 2. Kinetics Noise Control, Inc.
 3. Mason Industries, Inc.
 4. TOLCO; a brand of NIBCO INC.
- B. Hanger-Rod Stiffener: Reinforcing steel angle clamped to hanger rod.
- C. Hinged and Swivel Brace Attachments: Multifunctional steel connectors for attaching hangers to rigid channel bracings and restraint cables.
- D. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings and matched to type and size of attachment devices used.
- E. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

2.5 MECHANICAL ANCHOR BOLTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. B-line, an Eaton business.
 2. Hilti, Inc.
 3. Mason Industries, Inc.
- B. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

2.6 ADHESIVE ANCHOR BOLTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Hilti, Inc.
 2. Kinetics Noise Control, Inc.
 3. Mason Industries, Inc.
- B. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing PVC or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior

applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

- A. Multiple Raceways or Cables: Secure raceways and cables to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.
- B. Hanger-Rod Stiffeners: Install hanger-rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods caused by seismic forces.
- C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.3 SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Equipment and Hanger Restraints:
 - 1. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
 - 2. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- B. Install cables so they do not bend across edges of adjacent equipment or building structure.
- C. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

- D. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- E. Drilled-in Anchors:
 - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 - 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 - 3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - 4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
 - 5. Set anchors to manufacturer's recommended torque using a torque wrench.
 - 6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where connection is terminated to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections:
 - 1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
 - 2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
 - 3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
 - 4. Test at least **four** of each type and size of installed anchors and fasteners selected by Architect.
 - 5. Test to 90 percent of rated proof load of device.

- C. Seismic controls will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

3.6 ADJUSTING

- A. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 260548.16

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Color and legend requirements for raceways, conductors, and warning labels and signs.
 - 2. Labels.
 - 3. Tapes and stencils.
 - 4. Tags.
 - 5. Cable ties.
 - 6. Fasteners for labels and signs.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.
- B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: For each piece of electrical equipment and electrical system components to be an index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.
- D. Delegated-Design Submittal: For arc-flash hazard study.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with ASME A13.1.

- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Comply with NFPA 70E requirements for arc-flash warning labels.
- F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.
- G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces .

2.2 COLOR AND LEGEND REQUIREMENTS

- A. Raceways and Cables Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage.
- B. Color-Coding for Phase- Identification, 600 V or Less: Use colors listed below for ungrounded feeder and branch-circuit conductors.
 - 1. Color shall be factory applied.
 - 2. Colors for 208/120-V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 - 3. Colors for 240-V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - 4. Color for Neutral: White, with phase color strip running along entire length.
 - 5. Color for Equipment Grounds: Green.
- C. Warning Label Colors:
 - 1. Identify system voltage with black letters on an orange background.
- D. Warning labels and signs shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."

2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

E. Equipment Identification Labels:

1. Black letters on a white field.

2.3 LABELS

A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

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. Brady Corporation.
 - b. Grafoplast Wire Markers.
 - c. HellermannTyton.
 - d. Panduit Corp.

B. Self-Adhesive Wraparound Labels: Preprinted, 3-mil-thick, polyester flexible label with acrylic pressure-sensitive adhesive.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Brother International Corporation.
 - c. Grafoplast Wire Markers.
 - d. Ideal Industries, Inc.
 - e. Panduit Corp.
2. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
3. Marker for Labels: Permanent, waterproof, black ink marker recommended by tag manufacturer.
4. Marker for Labels: Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.

C. Self-Adhesive Labels: Polyester, thermal, transfer-printed, 3-mil-thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. [Brady Corporation.](#)
- b. [Brother International Corporation.](#)
- c. [Grafoplast Wire Markers.](#)
- d. [Ideal Industries, Inc.](#)
- e. [Panduit Corp.](#)

2. Minimum Nominal Size:

- a. 1-1/2 by 6 inches for raceway and conductors.
- b. 3-1/2 by 5 inches for equipment.
- c. As required by authorities having jurisdiction.

2.4 TAPES AND STENCILS

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

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. [Carlton Industries, LP.](#)
- b. [Ideal Industries, Inc.](#)
- c. [Marking Services, Inc.](#)
- d. [Panduit Corp.](#)

B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils thick by 1 to 2 inches wide; compounded for outdoor use.

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. [Brady Corporation.](#)
- b. [Carlton Industries, LP.](#)
- c. [Marking Services, Inc.](#)

2.5 SIGNS

A. Laminated Acrylic or Melamine Plastic Signs:

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. [Brady Corporation.](#)
- b. [Carlton Industries, LP.](#)
- c. [Marking Services, Inc.](#)

2. Engraved legend.
3. Thickness:
 - a. For signs up to 20 sq. in., minimum 1/16 inch thick.
 - b. For signs larger than 20 sq. in., 1/8 inch thick.
 - c. Engraved legend with black letters on white face.
 - d. Punched or drilled for mechanical fasteners.

2.6 CABLE TIES

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. [HellermannTyton.](#)
2. [Ideal Industries, Inc.](#)
3. [Marking Services, Inc.](#)
4. [Panduit Corp.](#)

B. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 Deg F according to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black, except where used for color-coding.

C. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 Deg F according to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black.

D. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 Deg F according to ASTM D 638: 7000 psi.
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F.
5. Color: Black.

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
- B. Install identifying devices before installing acoustical ceilings and similar concealment.
- C. Verify identity of each item before installing identification products.
- D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- E. Apply identification devices to surfaces that require finish after completing finish work.
- F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.
- G. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.
 - 1. Secure tight to surface of conductor, cable, or raceway.
- H. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.
- I. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:
 - 1. "POWER."
 - 2. "INTERCOM."
- J. Vinyl Wraparound Labels:

1. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
 2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.
- K. Self-Adhesive Wraparound Labels: Secure tight to surface at a location with high visibility and accessibility.
- L. Self-Adhesive Labels:
1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.
- M. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.
- N. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.
1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.
- O. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.
- P. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.
- Q. Laminated Acrylic or Melamine Plastic Signs:
1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high sign; where two lines of text are required, use labels 2 inches high.
- R. Cable Ties: General purpose, for attaching tags, except as listed below:
1. Outdoors: UV-stabilized nylon.
 2. In Spaces Handling Environmental Air: Plenum rated.

3.3 IDENTIFICATION SCHEDULE

- A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

- B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.
- C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels.
 - 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- D. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:
 - 1. "POWER."
 - 2. "INTERCOM."
- E. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use self-adhesive vinyl tape to identify the phase.
 - 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- F. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with the conductor or cable designation, origin, and destination.
- G. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive labels with the conductor designation.
- H. Workspace Indication: Apply floor marking tape to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- I. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.
- J. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive labels.
 - 1. Apply to exterior of door, cover, or other access.
 - 2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
 - a. Controls with external control power connections.
- K. Arc Flash Warning Labeling: Self-adhesive labels.

- L. Operating Instruction Signs: Laminated acrylic or melamine plastic signs.
- M. Equipment Identification Labels:
 - 1. Indoor Equipment: Laminated acrylic or melamine plastic sign.
 - 2. Outdoor Equipment: Laminated acrylic or melamine sign.
 - 3. Equipment to Be Labeled:
 - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of an engraved, laminated acrylic or melamine label.
 - b. Enclosures and electrical cabinets.
 - c. Access doors and panels for concealed electrical items.
 - d. Enclosed switches.
 - e. Enclosed circuit breakers.
 - f. Enclosed controllers.
 - g. Push-button stations.
 - h. Contactors.

END OF SECTION 260553

SECTION 260923 - 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. Indoor occupancy and vacancy sensors.
- B. Related Requirements:
 - 1. Section 262726 "Wiring Devices" for manual light switches.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 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.
- B. Sample Warranty: For manufacturer's warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of lighting control device to include in operation and maintenance manuals.

1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace lighting control devices that fail(s) in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:

- a. Faulty operation of lighting control devices.
2. Warranty Period: Two year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 INDOOR OCCUPANCY AND VACANCY SENSORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper Industries, Inc.
2. Hubbell Building Automation, Inc.
3. Leviton Manufacturing Co., Inc.
4. Sensor Switch, Inc.
5. WattStopper; a Legrand® Group brand.

B. General Requirements for Sensors:

1. Ceiling-mounted, solid-state indoor vacancy sensors.
2. Dual technology.
3. Separate power pack.
4. Hardwired connection to switch.
5. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
6. Operation:
 - a. Vacancy Sensor: Unless otherwise indicated, lights are manually turned on and sensor turns lights off when the room is unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
7. Sensor Output: Sensor is powered from the power pack.
8. Power: Line voltage.
9. Power Pack: Dry contacts rated for 20-A ballast or LED load at 120- and 277-V 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.
10. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box.
 - b. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
11. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
12. Bypass Switch: Override the "on" function in case of sensor failure.

13. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; turn lights off when selected lighting level is present.

C. 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-minimum movement of any portion of a human body that presents a target of not less than 36 sq. in., and detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch-high ceiling.

2.2 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 260523 "Control-Voltage Electrical Power Cables."

C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 260523 "Control-Voltage Electrical Power Cables."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.

B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.

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

3.2 SENSOR INSTALLATION

A. Comply with NECA 1.

- B. 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.
- C. 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.

3.3 CONTACTOR INSTALLATION

- A. Comply with NECA 1.
- B. 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.

3.4 WIRING INSTALLATION

- A. Comply with NECA 1.
- B. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260523 "Control-Voltage Electrical Power Cables." Minimum conduit size is 1/2 inch.
- C. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- D. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.
- E. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.5 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.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate lighting control devices and perform tests and inspections.
- B. Perform the following tests and inspections:
 - 1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Lighting control devices will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

3.7 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual occupied conditions. Provide up to two visits to Project 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 260923

SECTION 262726 - 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. GFCI receptacles.
 2. Toggle switches.
 3. Wall plates.

1.3 DEFINITIONS

- A. Abbreviations of Manufacturers' Names:
 1. Cooper: Cooper Wiring Devices; Division of Cooper Industries, Inc.
 2. Hubbell: Hubbell Incorporated: Wiring Devices-Kellems.
 3. Leviton: Leviton Mfg. Company, Inc.
 4. Pass & Seymour: Pass& Seymour/Legrand.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

1.4 ACTION SUBMITTALS

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

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.6 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.

PART 2 - PRODUCTS

2.1 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.
- D. Devices for Owner-Furnished Equipment:
 - 1. Receptacles: Match plug configurations.
- E. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GFCI RECEPTACLES

- A. General Description:
 - 1. 125 V, 20 A, straight blade, non-feed-through type.
 - 2. Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, UL 943 Class A, and FS W-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:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton (Arrow Hart).
 - b. Hubbell Incorporated; Wiring Device-Kellems.
 - c. Leviton Manufacturing Co., Inc.
 - d. Pass & Seymour/Legrand (Pass & Seymour).

2.3 TOGGLE SWITCHES

- A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277 V, 20 A:

1. Single Pole:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1) Eaton (Arrow Hart).
- 2) Hubbell Incorporated; Wiring Device-Kellems.
- 3) Leviton Manufacturing Co., Inc.
- 4) Pass & Seymour/Legrand (Pass & Seymour).

2.4 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: Smooth, high-impact thermoplastic.
3. Material for Unfinished Spaces: Smooth, high-impact thermoplastic.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover listed for wet locations while in use.

2.5 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: White unless otherwise indicated or required by NFPA 70 or device listing.

B. Wall Plate Color: For plastic covers, match device color.

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.
4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

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 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 up, 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, multigang wall plates.

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. Test Instruments: Use instruments that comply with UL 1436.
- B. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- C. 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.
- D. 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.
- E. Wiring device will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

END OF SECTION 262726

SECTION 262813 - 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 the following:
 - a. Control circuits.
 - b. Enclosed controllers.
 - c. Enclosed switches.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include construction details, material descriptions, dimensions of individual components and profiles, 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. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse. Submit in PDF format.
 5. Coordination charts and tables and related data.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals include the following:
1. Ambient temperature adjustment information.
 2. Current-limitation curves for fuses with current-limiting characteristics.
 3. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse used on the Project. Submit in PDF format.
 4. 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 three of each size and type.

1.6 FIELD CONDITIONS

- A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply manufacturer's ambient temperature adjustment factors to fuse ratings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Bussmann, an Eaton business.
 2. Littelfuse, Inc.
 3. Mersen USA.
- B. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.

2.2 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, current-limiting, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.
1. Type RK-5: 250-V, zero- to 600-A rating, 200 kAIC, time delay.

2. Type CC: 600-V, zero- to 30-A rating, 200 kAIC, fast acting.
- 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.
 - E. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

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. Control Transformer Circuits: Class CC, time delay, control transformer duty.
 3. Provide open-fuse indicator fuses or fuse covers with open fuse indication.

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 inside of door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 262813

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

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.
 - 2. Nonfusible switches.
 - 3. Enclosures.

1.3 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, 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 a nationally recognized testing laboratory (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.
 - 6. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.
- B. Shop Drawings: For enclosed switches and circuit breakers.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include wiring diagrams for power, signal, and control wiring.

1.5 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.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals.
 1. Include the following:
 - a. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
 - b. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. 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.

1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Accredited by NETA.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

1.9 FIELD 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 and not exceeding 104 deg F.
 2. Altitude: Not exceeding 6600 feet.

PART 2 - PRODUCTS

2.1 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."

2.2 GENERAL REQUIREMENTS

- A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.
- B. 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.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- D. Comply with NFPA 70.

2.3 FUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Eaton.
 2. General Electric Company.
 3. Siemens Industry, Inc., Energy Management Division.

4. Square D; by Schneider Electric.

B. Type HD, Heavy Duty:

1. Single throw.
2. Three pole.
3. 240-V ac.
4. 200 A and smaller.
5. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses.
6. 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. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
3. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 120-V ac.
4. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.4 NONFUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. General Electric Company.
3. Siemens Industry, Inc., Energy Management Division.
4. Square D; by Schneider Electric.

B. Type HD, Heavy Duty, Three Pole, Single Throw, 240-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, 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. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.5 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

- B. Enclosure Finish: The enclosure shall be a brush finish on Type 304 stainless steel (NEMA 250 Type 4-4X stainless steel).
- C. Conduit Entry: NEMA 250 Types 4, 4X, and 12 enclosures shall contain no knockouts.
- D. Operating Mechanism: The circuit-breaker operating handle shall be externally operable with the operating mechanism being an integral part of the box, not the cover. The cover interlock mechanism shall have an externally operated override. The override shall not permanently disable the interlock mechanism, which shall return to the locked position once the override is released. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.
- E. Enclosures designated as NEMA 250 Type 4, 4X stainless steel, 12, or 12K shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and to prevent turning the circuit breaker ON when the enclosure cover is open.

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.
 - 1. Commencement of work shall indicate Installer's acceptance of the areas and conditions as satisfactory.

3.2 PREPARATION

- A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
 - 1. Notify Owner no fewer than seven days in advance of proposed interruption of electric service.
 - 2. Indicate method of providing temporary electric service.
 - 3. Do not proceed with interruption of electric service without Owner's written permission.
 - 4. Comply with NFPA 70E.

3.3 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

- A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.
 - 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
 - 2. Outdoor Locations: NEMA 250, Type 4X stainless steel.
 - 3. Wet or Damp, Indoor Locations: NEMA 250, Type 4X stainless steel.

3.4 INSTALLATION

- A. Coordinate layout and installation of switches and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- C. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."
- D. Install fuses in fusible devices.
- E. Comply with NFPA 70 and NECA 1.

3.5 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.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- D. Perform tests and inspections.

E. Tests and Inspections for Switches:

1. Visual and Mechanical Inspection:

- a. Inspect physical and mechanical condition.
- b. Inspect anchorage, alignment, grounding, and clearances.
- c. Verify that the unit is clean.
- d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
- e. Verify that fuse sizes and types match the Specifications and Drawings.
- f. Verify that each fuse has adequate mechanical support and contact integrity.
- g. Inspect bolted electrical connections for high resistance using one of the two following methods:
 - 1) Use a low-resistance ohmmeter.
 - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
 - a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
- h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on the Drawings.
- i. Verify correct phase barrier installation.
- j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.

2. Electrical Tests:

- a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
- b. Measure contact resistance across each switchblade fuseholder. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
- c. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA

ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.

- d. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
- e. Perform ground fault test according to NETA ATS 7.14 "Ground Fault Protection Systems, Low-Voltage."

3.7 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 262816

SECTION 262913.03 - MANUAL AND MAGNETIC MOTOR CONTROLLERS

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. Manual motor controllers.
 - 2. Combination full-voltage magnetic motor controllers.
 - 3. Enclosures.
 - 4. Accessories.
 - 5. Identification.

1.3 DEFINITIONS

- A. CPT: Control power transformer.
- B. NC: Normally closed.
- C. OCPD: Overcurrent protective device.
- D. SCCR: Short-circuit current rating.
- E. SCPD: Short-circuit protective device.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Seismic Qualification Data: Certificates, for magnetic controllers, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For magnetic controllers to include in operation and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - a. Routine maintenance requirements for magnetic controllers and installed components.
 - b. Manufacturer's written instructions for testing and adjusting circuit breaker and MCP trip settings.
 - c. Manufacturer's written instructions for setting field-adjustable overload relays.
 - d. Load-Current and Overload-Relay Heater List: Compile after motors have been installed and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.
 - e. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed and arrange to demonstrate that switch settings for motor-running overload protection suit actual motors to be protected.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
2. Control Power Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.
3. Indicating Lights: Two of each type and color installed.
4. Auxiliary Contacts: Furnish one spare for each size and type of magnetic controller installed.
5. Power Contacts: Furnish three spares for each size and type of magnetic contactor installed.

1.8 QUALITY ASSURANCE

A. Testing Agency Qualifications: Accredited by NETA.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store controllers indoors in clean, dry space with uniform temperature to prevent condensation. Protect controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.
- B. If stored in areas subject to weather, cover controllers to protect them from weather, dirt, dust, corrosive substances, and physical damage. Remove loose packing and flammable materials from inside controllers;.

1.10 FIELD CONDITIONS

- A. Ambient Environment Ratings: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - 1. Ambient Temperature: Not less than 23 deg F and not exceeding 104 deg F.
 - 2. Altitude: Not exceeding 6600 feet for electromagnetic and manual devices.
 - 3. The effect of solar radiation is not significant.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- 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 use.
- B. UL Compliance: Fabricate and label magnetic motor controllers to comply with UL 508 and UL 60947-4-1.
- C. NEMA Compliance: Fabricate motor controllers to comply with ICS 2.
- D. Seismic Performance: Magnetic controllers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the controller will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
 - 2. Component Importance Factor: 1.0.

2.2 MANUAL MOTOR CONTROLLERS

- A. Fractional Horsepower Manual Controllers (FHPMC): "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off, on, or tripped.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton.

SECTION 262913.03 - MANUAL AND MAGNETIC MOTOR CONTROLLERS

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. Manual motor controllers.
 - 2. Combination full-voltage magnetic motor controllers.
 - 3. Enclosures.
 - 4. Accessories.
 - 5. Identification.

1.3 DEFINITIONS

- A. CPT: Control power transformer.
- B. NC: Normally closed.
- C. OCPD: Overcurrent protective device.
- D. SCCR: Short-circuit current rating.
- E. SCPD: Short-circuit protective device.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Seismic Qualification Data: Certificates, for magnetic controllers, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For magnetic controllers to include in operation and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - a. Routine maintenance requirements for magnetic controllers and installed components.
 - b. Manufacturer's written instructions for testing and adjusting circuit breaker and MCP trip settings.
 - c. Manufacturer's written instructions for setting field-adjustable overload relays.
 - d. Load-Current and Overload-Relay Heater List: Compile after motors have been installed and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.
 - e. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed and arrange to demonstrate that switch settings for motor-running overload protection suit actual motors to be protected.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
2. Control Power Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.
3. Indicating Lights: Two of each type and color installed.
4. Auxiliary Contacts: Furnish one spare for each size and type of magnetic controller installed.
5. Power Contacts: Furnish three spares for each size and type of magnetic contactor installed.

1.8 QUALITY ASSURANCE

A. Testing Agency Qualifications: Accredited by NETA.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store controllers indoors in clean, dry space with uniform temperature to prevent condensation. Protect controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.
- B. If stored in areas subject to weather, cover controllers to protect them from weather, dirt, dust, corrosive substances, and physical damage. Remove loose packing and flammable materials from inside controllers;.

1.10 FIELD CONDITIONS

- A. Ambient Environment Ratings: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - 1. Ambient Temperature: Not less than 23 deg F and not exceeding 104 deg F.
 - 2. Altitude: Not exceeding 6600 feet for electromagnetic and manual devices.
 - 3. The effect of solar radiation is not significant.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- 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 use.
- B. UL Compliance: Fabricate and label magnetic motor controllers to comply with UL 508 and UL 60947-4-1.
- C. NEMA Compliance: Fabricate motor controllers to comply with ICS 2.
- D. Seismic Performance: Magnetic controllers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the controller will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
 - 2. Component Importance Factor: 1.0.

2.2 MANUAL MOTOR CONTROLLERS

- A. Fractional Horsepower Manual Controllers (FHPMC): "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off, on, or tripped.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton.

- b. General Electric Company.
 - c. Siemens Industry, Inc., Energy Management Division.
 - d. Square D; by Schneider Electric.
2. Configuration: Nonreversing.
 3. Overload Relays: Inverse-time-current characteristics; NEMA ICS 2, Class 10 tripping characteristics; heaters matched to nameplate full-load current of actual protected motor; external reset push button; bimetallic type.
 4. Pilot Light: Red.

2.3 COMBINATION FULL-VOLTAGE MAGNETIC MOTOR CONTROLLER

- A. Description: Factory-assembled, combination full-voltage magnetic motor controller consisting of the controller described in this article, indicated disconnecting means, SCPD and OCPD, in a single enclosure.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Eaton.
 2. General Electric Company.
 3. Siemens Industry, Inc., Energy Management Division.
 4. Square D; by Schneider Electric.
- C. Standard: Comply with NEMA ICS 2, general purpose, Class A.
- D. Configuration: Nonreversing.
- E. Contactor Coils: Pressure-encapsulated type.
 1. Operating Voltage: Manufacturer's standard, unless indicated.
- F. Control Power:
 1. For on-board control power, obtain from line circuit or from integral CPT. The CPT shall have capacity to operate integral devices and remotely located pilot, indicating, and control devices.
 - a. Spare CPT Capacity as Indicated on Drawings: 50 VA.
- G. Overload Relays:
 1. Solid-State Overload Relay:
 - a. Switch or dial selectable for motor-running overload protection.
 - b. Sensors in each phase.
 - c. Class 10/20 selectable tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.
- H. Class II ground-fault protection shall comply with UL 1053 to interrupt low-level ground faults. The ground-fault detection system shall include circuitry that will prevent the motor controller from tripping when the fault current exceeds the interrupting capacity

- b. General Electric Company.
 - c. Siemens Industry, Inc., Energy Management Division.
 - d. Square D; by Schneider Electric.
2. Configuration: Nonreversing.
 3. Overload Relays: Inverse-time-current characteristics; NEMA ICS 2, Class 10 tripping characteristics; heaters matched to nameplate full-load current of actual protected motor; external reset push button; bimetallic type.
 4. Pilot Light: Red.

2.3 COMBINATION FULL-VOLTAGE MAGNETIC MOTOR CONTROLLER

- A. Description: Factory-assembled, combination full-voltage magnetic motor controller consisting of the controller described in this article, indicated disconnecting means, SCPD and OCPD, in a single enclosure.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Eaton.
 2. General Electric Company.
 3. Siemens Industry, Inc., Energy Management Division.
 4. Square D; by Schneider Electric.
- C. Standard: Comply with NEMA ICS 2, general purpose, Class A.
- D. Configuration: Nonreversing.
- E. Contactor Coils: Pressure-encapsulated type.
 1. Operating Voltage: Manufacturer's standard, unless indicated.
- F. Control Power:
 1. For on-board control power, obtain from line circuit or from integral CPT. The CPT shall have capacity to operate integral devices and remotely located pilot, indicating, and control devices.
 - a. Spare CPT Capacity as Indicated on Drawings: 50 VA.
- G. Overload Relays:
 1. Solid-State Overload Relay:
 - a. Switch or dial selectable for motor-running overload protection.
 - b. Sensors in each phase.
 - c. Class 10/20 selectable tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.
- H. Class II ground-fault protection shall comply with UL 1053 to interrupt low-level ground faults. The ground-fault detection system shall include circuitry that will prevent the motor controller from tripping when the fault current exceeds the interrupting capacity

of the controller. Equip with start and run delays to prevent nuisance trip on starting, and a trip indicator.

I. Fusible Disconnecting Means:

1. NEMA KS 1, heavy-duty, horsepower-rated, fusible switch with clips or bolt pads to accommodate Class RK5 fuses.
2. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.

2.4 ENCLOSURES

- A. Comply with NEMA 250, type designations as indicated on Drawings, complying with environmental conditions at installed location.
- B. The construction of the enclosures shall comply with NEMA ICS 6.

2.5 ACCESSORIES

- A. General Requirements for Control Circuit and Pilot Devices: NEMA ICS 5; factory installed in controller enclosure cover unless otherwise indicated.
 1. Push Buttons, Pilot Lights, and Selector Switches: Standard-duty, except as needed to match enclosure type.

2.6 IDENTIFICATION

- A. Controller Nameplates: Laminated acrylic or melamine plastic signs, as described in Section 260553 "Identification for Electrical Systems," for each compartment, mounted with corrosion-resistant screws.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and space conditions for compliance with requirements for motor controllers, their relationship with the motors, and other conditions affecting performance of the Work.

3.2 INSTALLATION

- A. Comply with NECA 1.
- B. Wall-Mounted Controllers: Install magnetic controllers on walls with tops at uniform height indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall.

- C. Comply with requirements for seismic control devices specified in Section 260548.16 "Seismic Controls for Electrical Systems."
- D. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.
- E. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.
- F. Setting of Overload Relays: Select and set overloads on the basis of full-load current rating as shown on motor nameplate. Adjust setting value for special motors as required by NFPA 70 for motors that are high-torque, high-efficiency, and so on.

3.3 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 1. Comply with the provisions of NFPA 70B, "Testing and Test Methods" Chapter.
 2. Visual and Mechanical Inspection:
 - a. Compare equipment nameplate data with drawings and specifications.
 - b. Inspect physical and mechanical condition.
 - c. Inspect anchorage, alignment, and grounding.
 - d. Verify the unit is clean.
 - e. Inspect contactors:
 - 1) Verify mechanical operation.
 - 2) Verify contact gap, wipe, alignment, and pressure are according to manufacturer's published data.
 - f. Motor-Running Protection:
 - 1) Verify overload element rating is correct for its application.
 - 2) If motor-running protection is provided by fuses, verify correct fuse rating.
 - g. Inspect bolted electrical connections for high resistance using one of the two following methods:

- 1) Use a low-resistance ohmmeter. Compare bolted connection resistance values with values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data or NETA ATS Table 100.12. Bolt-torque levels shall be according to manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
- h. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
3. Electrical Tests:
- a. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Insulation-resistance values shall be according to manufacturer's published data or NETA ATS Table 100.1. In the absence of manufacturer's published data, use Table 100.5. Values of insulation resistance less than those of this table or manufacturer's recommendations shall be investigated and corrected.
 - b. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
 - c. Perform operational tests by initiating control devices.
- D. Motor controller will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

3.5 SYSTEM FUNCTION TESTS

- A. System function tests shall prove the correct interaction of sensing, processing, and action devices. Perform system function tests after field quality control tests have been completed and all components have passed specified tests.
1. Develop test parameters and perform tests for the purpose of evaluating performance of integral components and their functioning as a complete unit within design requirements and manufacturer's published data.
 2. Verify the correct operation of interlock safety devices for fail-safe functions in addition to design function.
 3. Verify the correct operation of sensing devices, alarms, and indicating devices.
- B. Motor controller will be considered defective if it does not pass the system function tests and inspections.
- C. Prepare test and inspection reports.

3.6 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain switchgear.

END OF SECTION 262913.03

SECTION 262913.06 - SOFT-START MOTOR CONTROLLERS

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 soft-start motor controllers that are designed for reduced-voltage start and full-voltage run duty.
 - 1. Enclosed soft-start controllers.
 - 2. Enclosures.
 - 3. Accessories.
 - 4. Identification.

1.3 DEFINITIONS

- A. CPT: Control power transformer.
- B. FLA: Full-load current.
- C. MCCB: Molded-case circuit breaker.
- D. MCP: Motor circuit protector.
- E. NC: Normally closed.
- F. NO: Normally open.
- G. OCPD: Overcurrent protective device.
- H. SCCR: Short-circuit current rating.
- I. SCPD: Short-circuit protective device.
- J. SCR: Silicon-controlled rectifier.

1.4 ACTION SUBMITTALS

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

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For each type of controller.

1. Include plans, elevations, sections, and mounting details.
2. Indicate dimensions, weights, required clearances, and location and size of each field connection.
3. Wire Termination Diagrams and Schedules: Include diagrams for signal and control wiring. Identify terminals and wiring designations and color-codes to facilitate installation, operation, and maintenance. Indicate recommended types, wire sizes, and circuiting arrangements for field-installed wiring, and show circuit protection features. Differentiate between manufacturer-installed and field-installed wiring.
4. Include features, characteristics, ratings, and factory settings of individual OCPD and auxiliary components.

C. Product Schedule: For each enclosed controller.

1. Each installed soft-start controller type.
2. NRTL listing.
3. Factory-installed accessories.
4. Nameplate legends.
5. SCCR of integrated unit.
 - a. For each combination soft-start controller, include features, characteristics, ratings, and factory setting of the SCPD and OCPD.
 - 1) Listing document proving Type 2 coordination.
 - b. For each series-rated combination, state the listed integrated SCCR (withstand) of SCPDs and OCPDs by an NRTL acceptable to authorities having jurisdiction.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Seismic Qualification Data: Certificates, for soft-start controllers, 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. Source quality-control reports.

- D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For soft-start controllers to include in operation and maintenance manuals.
 - 1. Include the following:
 - a. Routine maintenance requirements for soft-start controllers and installed components.
 - b. Manufacturer's written instructions for testing and adjusting circuit-breaker and MCP trip settings.
 - c. Manufacturer's written instructions for testing, adjusting, and reprogramming reduced-voltage soft-start controllers.
 - d. Load-Current and Overload-Relay Heater List: Compile after motors have been installed, and arrange to demonstrate that selection of heaters suits actual motor nameplate FLAs.
 - e. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed, and arrange to demonstrate that switch settings for motor running overload protection suit actual motors to be protected.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Control Power Fuses: Equal to **10** percent of quantity installed for each size and type, but no fewer than **two** of each size and type.
 - 2. Indicating Lights: **Two** of each type and color installed.
 - 3. Auxiliary Contacts: Furnish **one** spare for each size and type of magnetic controller installed.
 - 4. Power Contacts: Furnish **three** spares for each size and type of magnetic contactor installed.

1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Accredited by NETA.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store soft-start controllers indoors in clean, dry space with uniform temperature to prevent condensation. Protect soft-start controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.

- B. If stored in areas subject to weather, cover soft-start controllers to protect them from weather, dirt, dust, corrosive substances, and physical damage. Remove loose packing and flammable materials from inside controllers.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - 1. Ambient Temperature: Not less than 32 deg F and not exceeding 104 deg F, humidity noncondensing.
 - 2. Altitude: Not exceeding 3300 feet.
 - 3. The effect of solar radiation is insignificant.
- B. Existing motor characteristics:
 - 1. Voltage: 230V, 3 phase, 3 wire
 - 2. Horsepower: 50 HP
 - 3. Full Load Amperes: 124A
 - 4. Code G
 - 5. Continuous Duty
 - 6. Service Factor: 1.15

PART 2 - PRODUCTS

2.1 MOTOR CONTROLLER PERFORMANCE REQUIREMENTS

- 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 use.
- B. UL Compliance: Fabricate and label enclosed controllers to comply with UL 508.
- C. NEMA Compliance: Fabricate motor controllers to comply with NEMA ICS 2.
- D. Seismic Performance: Soft-start controllers 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 when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
 - 2. Component Importance Factor: 1.0.

2.2 ENCLOSED SOFT-START MOTOR CONTROLLERS

- A. Description: Controllers designed for reduced-voltage start, full-voltage run, and optional soft stop. The controller shall be an integrated unit with power SCRs, heat sink,

microprocessor logic board, door-mounted digital display and user interface module, run-bypass contactor, and overload relay(s); suitable for use with NEMA MG 1, Design B, polyphase, medium induction motors.

1. Run-Bypass Contactor: Magnetic contactor in parallel with the SCR of the soft-start controller, bypassing the SCR when full voltage is achieved.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. General Electric Company.
3. Rockwell Automation, Inc.
4. Siemens Industry, Inc., Energy Management Division.
5. Square D; by Schneider Electric.

C. Standard: Comply with NEMA ICS 2, general purpose, Class A.

D. Configuration: Standard duty.

1. At least two SCRs per phase to control the starting and stopping of the motor.
2. Microprocessor control shall continuously monitor current and proper operation of the SCRs.
3. Bypass Contactor: Operates automatically when full voltage is applied to motor, and bypasses the SCRs. Soft-start controller protective features and deceleration controls shall remain active when this contactor is in the bypass mode.
4. Power Electronics Disconnect Contactor. Where indicated, installed ahead of the power electronics equipment, and shall open automatically when the motor is stopped, or a controller fault is detected, or when an SCR shorts.
5. Logic Board: Identical for all ampere ratings and voltage classes, with environmental protective coating.
6. Surge Protection: Comply with NEMA ICS 2 requirements for surge suppression.

E. Control Power:

1. For on-board control power, obtain from integral CPT. The CPT shall have capacity to operate integral devices and remotely located pilot, indicating, and control devices but shall not be less than 150 VA.

F. Controller Diagnostics and Protection:

1. Microprocessor-based thermal-protection system for monitoring SCR and motor thermal characteristics, and providing controller overtemperature and motor-overload alarm and trip; settings selectable via the keypad.
2. Protection from line-side reverse phasing; line-side and motor-side phase loss; motor jam, stall, and under-load conditions; and line frequency over or under normal.

3. Input isolation contactor that opens when the controller diagnostics detect a faulted soft-start component or when the motor is stopped.
- G. Cover mounted-controller status panel with LED lights or alphanumeric display to show the following:
1. Starter Status: "Ready," "starting," "stopping," or "run."
 2. Motor current in amperes.
 3. Faults:
 - a. Motor overcurrent trip.
 - b. Motor thermal overload.
 - c. Starter thermal fault.
 - d. Low line voltage.
 - e. Loss of a phase.
 - f. Phases reversed.
 - g. Maximum starting time exceeded.
 - h. Serial communications error.
- H. Interface Panel: Mounted on controller door.
1. Guarded adjustable set points, not readily accessible.
 - a. Motor FLA, adjustable from 40 to 110 percent of the controller's rating.
 - b. Current limitation on starting, adjustable from 200 to 500 percent of FLA, typically set at 300 percent.
 - c. NEMA ICS 2 overload class. Selections shall include the following tripping classes: Class 10.
 2. Adjustable set points, readily accessible.
 - a. Linear acceleration, adjustable from 1 to 60 s
 - b. Maximum start time, adjustable from 1 to 250 s.
 - c. Selector switch; select coast to stop or soft stop.
 - d. Linear deceleration, adjustable from 1 to 60 s.
- I. Remote Output Features. All outputs shall be prewired to terminal blocks.
1. Analog output for field-selectable assignment of motor operating characteristics; 4- to 20-mA dc.
 2. Form C status contacts that change state when controller is running.
 3. Form C alarm contacts that change state when a fault condition occurs.
- J. Digital Communication Module: RS-485 Modbus, RTU protocol, 2-wire connection to host devices with a compatible port to transmit the following to the LAN:
1. Instantaneous root mean square (rms) current each phase, and three-phase average.
 2. Voltage: L-L for each phase, L-L three-phase average, L-N each phase, and L-N three-phase average - rms.

3. Active Energy (kilowatt-hour): Three-phase total.
4. Power Factor: three-phase total.

2.3 ENCLOSURES

- A. Comply with NEMA 250, Type designations as indicated on Drawings, to comply with environmental conditions at installed location.
- B. Construction of the enclosures shall comply with NEMA ICS 6.

2.4 ACCESSORIES

- A. General Requirements for Control Circuit and Pilot Devices: NEMA ICS 5; factory installed in controller enclosure cover unless otherwise indicated.
 1. Push Buttons, Pilot Lights, and Selector Switches: Standard duty, except as needed to match enclosure type.
 - a. Push Buttons: Start-Stop, remote mounted as indicated.
 - b. Pilot Lights: red for motor running.
 2. Elapsed Time Meters: Heavy duty with digital readout in hours; nonresettable.
- B. Breather assemblies, to maintain interior pressure and release condensation in Type 4X enclosures installed outdoors or in unconditioned interior spaces subject to humidity and temperature swings.

2.5 IDENTIFICATION

- A. Controller Nameplates: Laminated acrylic or melamine plastic signs, as described in Section 260553 "Identification for Electrical Systems," for each compartment, mounted with corrosion-resistant screws.
- B. Arc-Flash Warning Labels:
 1. Comply with requirements in Section 260553 "Identification for Electrical Systems." Produce a 3-1/2-by-5-inch self-adhesive equipment label for each work location included in the analysis. Labels shall be machine printed, with no field-applied markings.
 - a. The label shall have an orange header with the wording, "WARNING, ARC-FLASH HAZARD," and shall include the following information taken directly from the arc-flash hazard analysis:
 - 1) Location designation.
 - 2) Nominal voltage.
 - 3) Flash protection boundary.
 - 4) Hazard risk category.

- 5) Incident energy.
- 6) Working distance.
- 7) Engineering report number, revision number, and issue date.

b. Labels shall be machine printed, with no field-applied markings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and space conditions for compliance with requirements for motor controllers, their relationship with the motors, and other conditions affecting performance of the Work.

3.2 INSTALLATION

- A. Comply with NECA 1.
- B. Wall-Mounted Controllers: Install controllers on walls with tops at uniform height indicated, and by bolting units to wall or mounting on slotted support systems complying with Section 260529 "Hangers and Supports for Electrical Systems," and bolted to wall.
- C. Comply with requirements for seismic control devices specified in Section 260548.16 "Seismic Controls for Electrical Systems."
- D. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.
- E. Control Wiring: Separate control wiring from power wiring. Where unavoidable, use twisted pair cabling or shielded cables for control wiring.
- F. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.
- G. Setting of Overload Relays: Select and set overloads on the basis of FLA rating as shown on motor nameplate. Adjust setting value for special motors as required by NFPA 70 for high-torque, high-efficiency, and so on motors.

3.3 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections with the assistance of a factory-authorized service representative.
- C. Tests and Inspections:
 - 1. Comply with provisions of NFPA 70B, Chapter "Testing and Test Methods."
 - 2. Visual and Mechanical Inspection:
 - a. Compare equipment nameplate data with Drawings and the Specifications.
 - b. Inspect physical and mechanical condition.
 - c. Inspect anchorage, alignment, and grounding.
 - d. Verify that the unit is clean.
 - e. Ensure that vent path openings are free from debris and that heat-transfer surfaces are clean.
 - f. Verify correct connections of circuit boards, wiring, disconnects, and ribbon cables.
 - g. Inspect Contactors:
 - 1) Verify mechanical operation.
 - 2) Verify that contact gap, wipe, alignment, and pressure are according to manufacturer's published data.
 - h. Motor-Running Protection:
 - 1) Verify that motor FLA is at, or under, the controller current rating.
 - 2) Verify that overload element setting is correct for its application.
 - 3) Apply minimum- and maximum-speed set points. Verify that set points are within limitations of the load coupled to the motor.
 - 4) If motor-running protection is provided by fuses, verify correct fuse rating.
 - i. Inspect bolted electrical connections for high resistance using one of the following two methods:
 - 1) Use a low-resistance ohmmeter. Compare bolted-connection-resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data or NETA ATS, Table 100.12. Bolt-torque levels shall be according to manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS, Table 100.12.

- j. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.

3. Electrical Tests:

- a. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Insulation-resistance values shall be according to manufacturer's published data or NETA ATS, Table 100.1. In the absence of manufacturer's published data, use Table 100.5. Values of insulation resistance less than this table or manufacturer's written instructions shall be investigated and corrected.
- b. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
- c. Test motor protection devices according to manufacturer's published data.
- d. Test circuit breakers as follows:
 - 1) Operate the circuit breaker to ensure smooth operation.
 - 2) For adjustable circuit breakers, adjust protective device settings according to the coordination study. Comply with coordination study recommendations.
- e. Test the electronic motor overload relay elements by injecting primary current through the overload circuit and monitoring trip time of the overload element.
- f. Test the following parameters according to NETA relay calibration procedures, or as recommended by manufacturer:
 - 1) ANSI No. 49R, Overtemperature Protection:
 - a) Determine time delay at 300 percent of setting.
 - b) Determine a second point on the operating curve.
 - c) Determine pickup.
 - 2) ANSI No. 47, Input Phase Loss and Reversed Phases Protection:
 - a) Determine positive sequence voltage to close the NO contact.
 - b) Determine positive sequence voltage to open the NC contact (undervoltage trip).
 - c) Verify negative sequence trip.
 - d) Determine time delay to close the NO contact with sudden application of 120 percent of pickup.
 - e) Determine time delay to close the NC contact on removal of voltage when previously set to rated system voltage.
 - 3) ANSI No. 81, Overfrequency Protection:
 - a) Verify frequency set points.
 - b) Determine time delay.
 - c) Determine undervoltage cutoff.

- 4) Fault Alarm Outputs: Verify that each relay contact performs its intended function in the control scheme including breaker trip tests, close inhibit tests, lockout tests, and alarm functions.
- g. Perform operational tests by initiating control devices.
- 4. Infrared Inspection: Perform the survey during periods of maximum possible loading. Remove all necessary covers prior to the inspection.
 - a. Comply with recommendations of NFPA 70B, Chapter "Testing and Test Methods," Article "Infrared Inspection."
 - b. After Substantial Completion, but not more than 60 days after Final Acceptance, perform infrared inspection of the electrical power connections of each motor controller.
 - c. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each motor controller 11 months after date of Substantial Completion.
 - d. Report of Infrared Inspection: Prepare a certified report that identifies the testing technician and equipment used, and lists the following results:
 - 1) Description of equipment to be tested.
 - 2) Discrepancies.
 - 3) Temperature difference between the area of concern and the reference area.
 - 4) Probable cause of temperature difference.
 - 5) Areas inspected. Identify inaccessible and unobservable areas and equipment.
 - 6) Identify load conditions at time of inspection.
 - 7) Provide photographs and thermograms of the deficient area.
 - 8) Recommended action.
 - e. Equipment: Inspect distribution systems with imaging equipment capable of detecting a minimum temperature difference of 1 degree C at 30 degrees C. The equipment shall detect emitted radiation and convert detected radiation to a visual signal.
 - f. Act on inspection results, recommended action, and considering recommendations of NETA ATS, Table 100.18. Correct possible and probable deficiencies as soon as Owner's operations permit. Retest until deficiencies are corrected.
- D. Motor controllers will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.5 SYSTEM FUNCTION TESTS

- A. System function tests shall prove the correct interaction of sensing, processing, and action devices. Perform system function tests after field quality-control tests have been completed and all components have passed specified tests.

1. Develop test parameters and perform tests for the purpose of evaluating performance of integral components and their functioning as a complete unit within design requirements and manufacturer's published data.
 2. Verify the correct operation of interlock safety devices for fail-safe functions in addition to design function.
 3. Verify the correct operation of sensing devices, alarms, and indicating devices.
- B. Motor controllers will be considered defective if they do not pass the system function tests and inspections.
- C. Prepare test and inspection reports.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain motor controllers.

END OF SECTION 262913.06

SECTION 265119 - LED INTERIOR LIGHTING

PART 1 - 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 the following types of LED luminaires:
 - 1. Materials.
 - 2. Finishes.
 - 3. Luminaire support.
- B. Related Requirements:
 - 1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. LED: Light-emitting diode.
- F. Lumen: Measured output of lamp and luminaire, or both.
- G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Arrange in order of luminaire designation.
 - 2. Include data on features, accessories, and finishes.
 - 3. Include physical description and dimensions of luminaires.

4. Include emergency lighting units, including batteries and chargers.
5. Include life, output (lumens, CCT, and CRI), and energy efficiency data.
6. Photometric data and adjustment factors based on laboratory tests, complying with IES Lighting Measurements Testing and Calculation Guides, of each luminaire type. The adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in this Project, IES LM-79 and IES LM-80.
 - a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
 - b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.

B. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

C. Qualification Data: For testing laboratory providing photometric data for luminaires.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.

1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

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. Diffusers and Lenses: Furnish at least one of each type.

1.7 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.

B. 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, accredited under the NVLAP for Energy Efficient Lighting Products, and complying with the applicable IES testing standards.

C. Provide luminaires from a single manufacturer for each luminaire type.

- D. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.9 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
- B. Warranty Period: Five year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE 7.
 - 1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."

2.2 LUMINAIRE REQUIREMENTS

- 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. Standards:
 - 1. ENERGY STAR certified.
 - 2. California Title 24 compliant.
 - 3. UL Listing: Listed for damp location.
- C. CRI of minimum 80. CCT of 4000 K.
- D. Rated lamp life of 35,000 hours to L70.
- E. Lamps dimmable from 100 percent to 0 percent of maximum light output.
- F. Internal driver.

- G. Nominal Operating Voltage: 120/277 V ac.
 - 1. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.

- H. Housings:
 - 1. Stainless steel housing and heat sink.
 - 2. Brushed finish.

2.3 MATERIALS

- A. Metal Parts:
 - 1. Free of burrs and sharp corners and edges.
 - 2. Sheet metal components shall be steel unless otherwise indicated.
 - 3. Form and support to prevent warping and sagging.
- B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit servicing without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during servicing and when secured in operating position.
- C. Factory-Applied Labels: Comply with UL 1598. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
 - 1. Label shall include the following lamp characteristics:
 - a. CCT and CRI for all luminaires.

2.4 METAL FINISHES

- A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.5 LUMINAIRE SUPPORT

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

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 the Work.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Install lamps in each luminaire.
- D. Supports:
 - 1. Sized and rated for luminaire weight.
 - 2. Able to maintain luminaire position after cleaning and servicing.
 - 3. Provide support for luminaire without causing deflection of ceiling or wall.
 - 4. Luminaire mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and vertical force of 400 percent of luminaire weight.
- E. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

3.3 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.

- B. Luminaire will be considered defective if it does not pass operation tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 265119

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. Stripping and stockpiling rock.
6. Removing above- and below-grade site improvements.
7. Disconnecting, capping or sealing, and removing site utilities.
8. Temporary erosion and sedimentation control.

1.2 DEFINITIONS

- A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow.
- D. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects larger than 2 inches in diameter; and free of weeds, roots, toxic materials, or other non-soil materials.
- E. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- F. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings.
- G. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 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.

1.5 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
 - 1. Use sufficiently detailed photographs or video recordings.
 - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.
- B. Topsoil stripping and stockpiling program.
- C. Rock stockpiling program.
- D. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.
- E. Burning: Documentation of compliance with burning requirements and permitting of authorities having jurisdiction. Identify location(s) and conditions under which burning will be performed.

1.6 QUALITY ASSURANCE

- A. Topsoil Stripping and Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.
- B. Rock Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.

1.7 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. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
 - 1. Do not proceed with work on adjoining property until directed by Architect.
- C. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises per direction of the Senior Center Site operations and maintenance manager.
- D. Utility Locator Service: Notify Call Before You Dig for area where Project is located before site clearing.
- E. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.
- F. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312316 "Excavation and Backfill – Civil Site Work."
 - 1. 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.
- 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 TREE AND PLANT PROTECTION

- A. Protect trees and plants remaining on-site.
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations.
- C. Any trimming of bushes or trees during construction may require a bird nest survey to comply with the Migratory Bird Treaty Act. Please contact Environmental Permitting Section prior to any trimming activities in order to complete this survey in-house.

3.4 EXISTING UTILITIES

- A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
 - 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.
- B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.
 - 1. Arrange with utility companies to shut off indicated utilities.
 - 2. Owner will arrange to shut off indicated utilities when requested by Contractor.
- C. Locate, identify, and disconnect utilities indicated to be abandoned in place.
- D. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify City not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Owner's written permission.

- E. Excavate for and remove underground utilities indicated to be removed.
- F. Removal of underground utilities is included in earthwork sections; in applicable fire suppression, plumbing, HVAC, electrical, communications, electronic safety and security, and utilities sections; and in Section 024119 "Selective Demolition."

3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Grind down stumps and remove roots larger than 2 inches in diameter, obstructions, and debris to a depth of 3 feet below exposed subgrade.
 - 3. Use only hand methods or air spade for grubbing within protection zones.
 - 4. Chip removed tree branches and dispose of off-site.
- 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.

3.6 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.
 - 1. Remove subsoil and non-soil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches in diameter; trash, debris, weeds, roots, and 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.
 - 1. Limit height of topsoil stockpiles to 72 inches.
 - 2. Do not stockpile topsoil within protection zones.
 - 3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
 - 4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.7 STOCKPILING ROCK

- A. Remove from construction area naturally formed rocks that measure more than 6 inches across in least dimension. Do not include excavated or crushed rock.
 - 1. Separate or wash off non-rock materials from rocks, including soil, clay lumps, gravel, and other objects larger than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.
- B. Stockpile rock away from edge of excavations without intermixing with other materials. Cover to prevent windblown debris from accumulating among rocks.
 - 1. Limit height of rock stockpiles to 36 inches
 - 2. Do not stockpile rock within protection zones.
 - 3. Dispose of surplus rock. Surplus rock is that which exceeds quantity indicated to be stockpiled or reused.
 - 4. Stockpile surplus rock to allow later use by the Owner.

3.8 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
 - 2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.9 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.
- B. Burning tree, shrub, and other vegetation waste is permitted according to burning requirements and permitting of authorities having jurisdiction. Control such burning to produce the least smoke or air pollutants and minimum annoyance to surrounding properties. Burning of other waste and debris is prohibited.
- C. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials, and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 311000

SECTION 312316 - EXCAVATION AND BACKFILL - CIVIL SITE WORK

PART 1 GENERAL

1.1 SUMMARY

A. Work Included:

This section shall consist of:

- Unclassified Excavation and Fill,
- Structure Excavation and Backfill
- Unsuitable Excavation,
- Trench excavation,
- Excavation for miscellaneous site structures,
- Excavation for slab on grades,
- Imported Backfill,
- Unclassified Fill,
- Temporary Shoring,
- Export Excess Material,
- Subgrade Stabilization

B. Reference Standards:

This Special Provision makes references to the Standard Specifications for Public Works Construction (Greenbook), referred to collectively hereinafter as SSPWC; and to the Regional Standard Drawings, referred to hereinafter as RSD.

1.2 RELATED SECTIONS

- A. Section 033310 – Structural and Civil Concrete,
- B. Section 311000 – Site Clearing,
- C. Section 312500 – Erosion and Sedimentation Control

1.3 PROJECT CONDITIONS

- A. The groundwater elevation is believed to fluctuate seasonally. Therefore, it is not known what the groundwater surface elevation will be at the time of construction.

- B. Contractor to coordinate with City of San Diego to determine MBTA nest survey requirements prior to construction.

1.4 SUBMITTALS

- A. Materials Source: Submit name of imported fill materials suppliers.
- B. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.
- C. Imported Backfill: Submit gradation and soil testing data.

1.5 QUALIFICATIONS

- A. Prepare excavation protection plan under direct supervision of a Professional Engineer experienced in design of this Work and licensed in the State of California.
 - 1. Assume sole responsibility for excavation protection plan and for loss or damage resulting from partial or complete failure of protective measures and settlement or resultant damage caused by excavation protection plan.

PART 2 PRODUCTS

2.1 FILL MATERIALS

- A. Native Fill:
 - 1. Excavated and re-used clean material.
 - 2. Free of plastic/clay soils and vegetable or organic matter, such as; muck, peat, organic silt, or sod. Material containing these properties shall be considered unsuitable.
 - 3. Free of lumps larger than 3 inches, rocks larger than 3 inches, and debris.
 - 4. Compaction requirements and moisture conditioning as indicated on the plans and these Special Provisions.
- B. Imported Backfill
 - 1. If native materials are not suitable as determined by the City, import materials must be clean granular material that has less than 30 percent passing the #200 sieve, a minimum R-value of 30, and a very low expansion index (Expansion Index of 20 or less) as evaluated by ASTM D 4829 (Expansion Index Test). Import material should exhibit a low corrosivity potential. Low corrosivity material is defined as having a

minimum resistivity of more than 2,000 ohm-cm, a chloride content less than 200 parts per million (PPM), and a sulfate content less than 0.05 percent when tested in accordance with California Tests 643, 422, and 417, respectively unless defined otherwise by the corrosion consultant.

C. Structural Fill:

1. Structural Fill (to be backfilled against manholes, clean outs, or storm drain inlets) shall be per Section 300-3.1 and 300-3.5 of the SSPWC. Material used as structural backfill shall have a sand equivalent of not less than 20 and shall have a gradation as shown in SSPWC Table 300-3.5.1.

D. Granular Fill: Sand, gravel, or crushed aggregate with a sand equivalent (SE) of not less than 30.

E. $\frac{3}{4}$ " crushed rock shall be per SSPWC 200-1.2

2.2 ROCK PRODUCTS

- A. Rock Products including Crushed Rock and Rock Dust, Gravel, and Sand shall conform to the requirements of Section 200-1 of the SSPWC.

2.3 UNTREATED BASE MATERIALS

- A. Untreated Base Materials including Crushed Aggregate Base, Crushed Miscellaneous Base, Processed Miscellaneous Base, Select Subbase, Disintegrated Granite and Pulverized Miscellaneous Base shall conform to the requirements of Section 200-2 of the SSPWC.

PART 3 EXECUTION

3.1 UNCLASSIFIED EXCAVATION

- A. Unclassified excavation shall conform to the requirements of Section 300-2 of the SSPWC.

3.2 UNCLASSIFIED FILL

- A. Unclassified fill shall conform to the requirements of Section 300-4 of the SSPWC.

3.3 STRUCTURE EXCAVATION

- A. Structure excavation shall conform to the requirements of Section 300-3.1 through 300-3.3 of the SSPWC.
- B. Any material encountered beyond the limits of structure excavation shown on the Plans that are determined to be unsuitable material by the Resident engineer shall be removed and be disposed of and backfilled as required by these Special Provisions.
- C. Temporary shoring and bracing of excavations shall conform to the requirements, rules, orders and regulations of the Division of Industrial Safety of the State of California, Cal/OSHA, and/or other governing regulations pertaining to excavation safety.

3.4 STRUCTURE BACKFILL

- A. Structure backfill shall conform to the requirements of Section 300-3.1 and 300-3.5 of the SSPWC.

3.5 TRENCH EXCAVATION AND BACKFILL

- A. Trench excavation shall conform to the requirements of Section 306-1.1 of the SSPWC, and these special provisions.
- B. Temporary shoring and bracing of excavations shall conform to the requirements, rules, orders and regulations of the Division of Industrial Safety of the State of California, Cal/OSHA, and/or other governing regulations pertaining to excavation safety.
- C. Existing facilities adjacent to the trench shall be protected in place. Contractor is responsible for whatever means and methods are necessary to protect all existing facilities in place.
- D. Restore curb, gutter, sidewalk, pavements, traffic striping and marking, and other site surface features including landscaping over trenching and excavations and to match existing. Contractor is responsible for determining trench width necessary for construction. Contractor is responsible for restoring all surface features disturbed during construction.
- E. Any material, encountered during trenching, containing plastic/clay soils, vegetable or organic matter, such as muck, peat, organic silt, or sod shall be considered unsuitable for use and be disposed of as required by these Special

Provisions. All work associated with the excavation, segregation, and disposal of this material shall be done at no additional cost to the City.

- F. Contractor shall use imported backfill in accordance with SSPWC Section 306-1.3.7 and these Special Provisions for the trench backfill and pipe embedment material in areas where the excavated soil contains clay or other material and has been determined to be unsuitable for reuse. This material shall not be considered unsuitable material if it can be dried and used as backfill in accordance with the Special Provisions. Imported backfill shall be placed in accordance with the plans and these Special Provisions.
- G. Place fill material in continuous layers and compact in accordance with the Plans. Trench Backfill (Trench Zone), Pipe Embedment Zone (Pipe Zone), and Foundation Material (Pipe Bedding) shall be as indicated in this Special Provisions.
 - 1. Trench Backfill Material (Trench Zone – 12 inches above the pipe to the subgrade): As specified on the drawings.
 - 2. Pipe Embedment Material (Pipe Zone – Invert of Pipe to 12 inches above pipe): As specified on the drawings.
- H. Backfilling within the Trench (Trench Zone) shall be in accordance with SSPWC 306-1.3 except that jetted backfill will not be allowed and compaction, loose lift thickness, depths of trench zone, pipe zone, and pavement shall be as indicated on the drawings.

3.6 EXPORT EXCESS MATERIAL

- A. Remove and export excess excavated materials not intended for reuse.

3.7 SUBGRADE PREPARATION

- A. For subgrade preparation as identified on the plans, the top 12-inches of the subgrade shall be removed and temporarily stockpiled and the bottom 6-inches of material shall be scarified in place, moisture conditioned and then recompact.

The stockpiled material, assuming it is suitable material, shall then be placed over the 6-inches of compacted material. This 12-inches of subgrade of suitable granular (non-plastic) material shall be moisture conditioned to within +/-2 percent of optimum moisture content before rolling to obtain the prescribed compaction. Rolling operations shall be continued until the subgrade is compacted to not less than 95 percent of maximum density as determined by ASTM D 1557. The subgrade material shall be placed and compacted in lifts not exceeding 8-inches in loose thickness.

If this material is unsuitable then stabilize the subgrade. Lime Treatment can be considered by the contractor as an alternate for either drying or strengthening the subgrade soils and shall conform to the requirements in SSPWC 301-5.

- B. Proof rolling shall be done on the exposed subgrade surface free of surface water. Proof-roll the subgrade in the presence of the City. Operate the vehicle used in a systematic manner to ensure uniform coverage over all areas and at a speed of 3 miles per hour. Notify the City a minimum of 3 days prior to proof rolling. Proof rolling shall be performed in the presence of the City. If the subgrade surface does exhibit signs of significant flexing, rutting, or pumping under proof rolling this area must be over excavated and stabilized.

Proof Rolling shall be considered included in the price bid for Subgrade Preparation and no separate payment will be made therefore.

3.8 UNSUITABLE EXCAVATION

- A. There may be areas where over excavation and subgrade stabilization will be required. Unsuitable Excavation shall be performed in locations where plastic/clay material is encountered and proof rolling has demonstrated that significant flexing, rutting, or pumping has occurred. These areas shall be over-excavated a minimum of 1 foot below subgrade. The over-excavated material shall be considered unsuitable for reuse in the project and be disposed of as required by these Special Provisions.

The over-excavated area shall then be backfilled with suitable material and stabilized.

3.9 QUALITY CONTROL

- A. The following standards shall be used for materials acceptance testing:
 - 1. ASTM D 698 Test for Moisture Density Relations of Soils and Soil Aggregate Mixtures, Using 5.5 pound Rammer and 12-inch Drop
 - 2. ASTM D 1556 Test for Density of Soil In-Place by the Sand-Cone Method
 - 3. ASTM D 1557 Test for Moisture-Density Relations of Soils and Soil Aggregate Mixtures, Using a 10-pound Rammer and 18-inch Drop
 - 4. ASTM D 2922 Density of Soil and Soil-Aggregate in Place by Nuclear Methods

5. ASTM D 3017 Water Content of Soil and Rock In-Place by Nuclear Methods

END OF SECTION 312316

SECTION 312500 - EROSION AND SEDIMENTATION CONTROL

PART 1 – GENERAL

1.1 SUMMARY

A. Work Included:

This section shall consist of furnishing, installing, moving, and maintaining temporary erosion and sedimentation control measures in accordance with these Special Provisions, as shown on the Plans. This shall include, but not be limited to, implementation of the erosion and sediment control measures, monitoring, sampling, and reporting.

B. Reference Standards:

This Special Provision makes references to the latest version of the California Stormwater Quality Association Best Management Practices (CASQA BMP) Handbook.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data on all proposed erosion and sediment control materials including fiber rolls, Gravel Bag Berm, Storm Drain Inlet Protection, or any other erosion or sediment controls proposed for use, including construction dewatering water quality control devices, if not submitted in dewatering submittals.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Erosion and sedimentation control measures installed shall conform to the latest version of the CASQA BMP Handbook, the Plans, and these Special Provisions.

- Check Dam (SE-4)
- Fiber Roll (SE-5)
- Gravel Bag Berm (SE-6)
- Storm Drain Inlet Protection (SE-10)
- Stabilized Construction Entrance/Exit (TC-1)
- Entrance/Outlet Tire Wash (TC-3)
- Stockpile Management (WM-3)
- Concrete Waste Management (WM-8)
- Dewatering Operations (NS-2)
- Clear Water Diversion (NS-5)

PART 3 – EXECUTION

3.1 BMP PLACEMENT

- A. BMPs shall be placed on the site prior to starting any construction activities.
- B. BMPs shall be placed and maintained in accordance with the CASQA BMP Handbook, the Plans, these Special Provisions.
- C. BMPs shall be maintained continuously throughout the duration of construction and until each work area has been accepted for use by the City of San Diego. Damaged, displaced, or non-functional BMPs shall be replaced immediately.

A. END OF SECTION 312500

SECTION 321216 - ASPHALT PAVING AND AGGREGATE BASE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cold milling of existing asphalt pavement.
2. Hot-mix asphalt patching.
3. Hot-mix asphalt paving.
4. Hot-mix asphalt overlay.
5. Asphalt curbs.
6. Asphalt traffic-calming devices.
7. Asphalt surface treatments.
8. Aggregate Base Course.

B. Related Requirements:

1. Section 024119 "Selective Demolition" for demolition and removal of existing asphalt pavement.
2. Section 312316 "Excavation and Backfill Civil Site Work" for subgrade preparation, fill material, separation geotextiles, unbound-aggregate subbase and base courses.
3. Section 033310 "Structural and Civil Concrete" for concrete pavement and for separate concrete curbs, gutters, and driveway aprons.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:
 - a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
 - b. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include technical data and tested physical and performance properties.
2. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
3. Job-Mix Designs: For each job mix proposed for the Work.

B. Samples for Verification: For the following product, in manufacturer's standard sizes unless otherwise indicated:

1. Paving Fabric: 12 by 12 inches (300 by 300 mm) minimum.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and testing agency.
- B. Material Certificates: For each paving material.
- C. Material Test Reports: For each paving material, by a qualified testing agency.
- D. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: **A** paving-mix manufacturer registered with and approved by authorities having jurisdiction or the California DOT.
- B. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.
- C. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the Greenbook for asphalt paving work.
 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
 1. Prime Coat: Minimum surface temperature of 60 deg F.
 2. Tack Coat: Minimum surface temperature of 60 deg F.
 3. Slurry Coat: Comply with weather limitations in ASTM D 3910.
 4. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
 5. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Coarse Aggregate: ASTM D 692/D 692M, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.
- C. Fine Aggregate: ASTM D 1073, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.
 - 1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.
- D. Mineral Filler: ASTM D 242/D 242M, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

- A. Asphalt Binder: ASTM D 6373 binder designation PG 64-10.
- B. Tack Coat: ASTM D 977 emulsified asphalt, or ASTM D 2397/D 2397M cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.
- C. Fog Seal: ASTM D 977 emulsified asphalt, or ASTM D 2397/D 2397M cationic emulsified asphalt, slow setting, factory diluted in water, of suitable grade and consistency for application.
- D. Water: Potable.

2.3 AUXILIARY MATERIALS

- A. Herbicide: Commercial chemical for weed control, registered by the EPA, and not classified as "restricted use" for locations and conditions of application. Provide in granular, liquid, or wettable powder form.
- B. Sand: ASTM D 1073.
- C. Paving Geotextile: per plans.
- D. Joint Sealant: ASTM D 6690, Type I, hot-applied, single-component, polymer-modified bituminous sealant.

2.4 MIXES

- A. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction; designed according to procedures in AI MS-2, "Asphalt Mix Design Methods"; and complying with the following requirements:
 - 1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
 - 2. Base Course: Type III, Class B2 per Greenbook Section 400-4.3.
 - 3. Surface Course: Type III, Class C2 per Greenbook Section 400-4.3.

2.5 AGGREGATE BASE MATERIALS

- A. Aggregate Base shall be constructed in conformance with the SSPWC Section 301.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protection: Provide protective materials, procedures, and worker training to prevent asphalt materials from spilling, coating, or building up on curbs, driveway aprons, manholes, and other surfaces adjacent to the Work.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph (5 km/h).
 - 2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes).
 - 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

3.3 COLD MILLING

- A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.

1. Mill to a depth of 1-1/2 inches (38 mm) minimum.
2. Mill to a uniform finished surface free of excessive gouges, grooves, and ridges.
3. Control rate of milling to prevent tearing of existing asphalt course.
4. Repair or replace curbs, driveway aprons, manholes, and other construction damaged during cold milling.
5. Excavate and trim unbound-aggregate base course, if encountered, and keep material separate from milled hot-mix asphalt.
6. Patch surface depressions deeper than 1 inch (25 mm) after milling, before wearing course is laid.
7. Handle milled asphalt material according to waste management requirements in The "Whitebook"
8. Keep milled pavement surface free of loose material and dust.
9. Do not allow milled materials to accumulate on-site.

3.4 PATCHING

- A. Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Tack Coat: Before placing patch material, apply tack coat uniformly to vertical asphalt surfaces abutting the patch. Apply at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).
 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- C. Placing Patch Material: Fill excavated pavement areas with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.
- D. Placing Patch Material: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.5 REPAIRS

- A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch (25 mm) in existing pavements.
 1. Install leveling wedges in compacted lifts not exceeding 3 inches (75 mm) thick.
- B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of 1/4 inch (6 mm).
 1. Clean cracks and joints in existing hot-mix asphalt pavement.

2. Use emulsified-asphalt slurry to seal cracks and joints less than 1/4 inch (6 mm) wide. Fill flush with surface of existing pavement and remove excess.
3. Use hot-applied joint sealant to seal cracks and joints more than 1/4 inch (6 mm) wide. Fill flush with surface of existing pavement and remove excess.

3.6 SURFACE PREPARATION

- A. Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.
 1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.
- C. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).
 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.7 PLACING HOT-MIX ASPHALT

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
 1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
 2. Place hot-mix asphalt surface course in single lift.
 3. Spread mix at a minimum temperature of 300 deg F.
 4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
 5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet (3 m) wide unless infill edge strips of a lesser width are required.
 1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Overlap mix placement about 1 to 1-1/2 inches (25 to 38 mm) from strip to strip to ensure proper compaction of mix along longitudinal joints.
 2. Complete a section of asphalt base course before placing asphalt surface course.

- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.8 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
 - 1. Clean contact surfaces and apply tack coat to joints.
 - 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches (150 mm).
 - 3. Offset transverse joints, in successive courses, a minimum of 24 inches (600 mm).
 - 4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints per Greenbook standards.
 - 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 - 6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.9 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
 - 1. Complete compaction before mix temperature cools to 210 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 - 1. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041/D 2041M, but not less than 90 percent or greater than 96 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.10 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 - 1. Base Course: Plus or minus 1/2 inch (13 mm).
 - 2. Surface Course: Plus 1/4 inch (6 mm), no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved areas:
 - 1. Base Course: 1/4 inch (6 mm).
 - 2. Surface Course: 1/8 inch (3 mm).
 - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch (6 mm).
- C. Asphalt Traffic-Calming Devices: Compact and form asphalt to produce the contour indicated and within a tolerance of plus or minus 1/8 inch (3 mm) of height indicated above pavement surface.

3.11 SURFACE TREATMENTS

- A. Fog Seals: Apply fog seal at a rate of 0.10 to 0.15 gal./sq. yd. (0.45 to 0.7 L/sq. m) to existing asphalt pavement and allow to cure. With fine sand, lightly dust areas receiving excess fog seal.

3.12 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549/D 3549M.
- C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

- D. Asphalt Traffic-Calming Devices: Finished height of traffic-calming devices above pavement will be measured for compliance with tolerances.
- E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979/D 979M.
 - 1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041/D 2041M, and compacted according to job-mix specifications.
 - 2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726/D 2726M.
 - a. One core sample will be taken for every 1000 sq. yd. (836 sq. m) or less of installed pavement, with no fewer than three cores taken.
 - b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726/D 2726M.
- F. Replace and compact hot-mix asphalt where core tests were taken.
- G. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.13 WASTE HANDLING

- A. General: Handle asphalt-paving waste according to waste management requirements in The "Whitebook".

3.16 AGGREGATE BASE

- A. Aggregate Base shall be constructed in conformance with the SSPWC Section 301.

END OF SECTION 321216

SECTION 321723 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes painted markings applied to asphalt pavement.
- B. Related Requirements:
 - 1. Section 099113 "Exterior Painting" for painting exterior concrete surfaces other than pavement.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to marking pavement including, but not limited to, the following:
 - a. Pavement aging period before application of pavement markings.
 - b. Review requirements for protecting pavement markings, including restriction of traffic during installation period.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include technical data and tested physical and performance properties.
- B. Shop Drawings: For pavement markings.
 - 1. Indicate pavement markings, colors, lane separations, defined parking spaces, and dimensions to adjacent work.
 - 2. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of San Diego Regional Standard Drawings and Specifications and the Greenbook for pavement-marking work.
 - 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 55 deg F (12.8 deg C) for water-based materials, and not exceeding 95 deg F (35 deg C).

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2016 ADA Standards for Accessible Design".

2.2 PAVEMENT-MARKING PAINT

- A. Pavement-Marking Paint: MPI #32, solvent-borne traffic-marking paint.
 - 1. Color: White and Blue.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.
- B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.2 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow paving to age for a minimum of 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils (0.4 mm).
 - 1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil

to prevent paint application beyond stencil. Apply paint so that it cannot run beneath stencil.

2. Broadcast glass beads uniformly into wet markings at a rate of 6 lb/gal. (0.72 kg/L).

3.3 PROTECTING AND CLEANING

- A. Protect pavement markings from damage and wear during remainder of construction period.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 321723

SECTION 323113 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Chain-link fences.
2. Swing gates.

B. Related Requirements:

1. Section 033310 "Structural and Civil Concrete" for cast-in-place concrete post footings.
2. Section 087100 "Door Hardware".

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Inspect and discuss electrical roughing-in and other preparatory work specified elsewhere.
2. 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 the following:
 - a. Fence and gate posts, rails, and fittings.
 - b. Chain-link fabric, reinforcements, and attachments.
 - c. Gates and hardware.

B. Shop Drawings: For each type of fence and gate assembly.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include accessories, hardware, gate operation, and operational clearances.

C. Samples for Initial Selection: For each type of factory-applied finish.

D. Samples for Verification: For each type of component with factory-applied finish, prepared on Samples of size indicated below:

1. Polymer-Coated Components: In 6-inch (150-mm) lengths for components and on full-sized units for accessories.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of chain-link fence and gate.
- B. Sample Warranty: For special warranty.

1.5 FIELD 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.

1.6 WARRANTY

- A. Special Warranty: Manufacturer 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. Failure to comply with performance requirements.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 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 according to "CLFMI Product Manual" and requirements indicated below:
 1. Fabric Height: As indicated on Drawings.
 2. Steel Wire for Fabric: Wire diameter of 0.120 inch (3.05 mm).
 - a. Mesh Size: 3/8" inch.
 - 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, according to ASTM F 934.
 3. Selvage: Knuckled at both selvages.

2.2 FENCE FRAMEWORK

- A. Posts and Rails: As needed for posts that require replacement or need to be added. ASTM F 1043 for framework, 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. Light-Industrial-Strength Material: Group IC-L, round steel pipe, electric-resistance-welded pipe; Group II-L, roll-formed-steel C-section shapes; or Group III-L, hot-rolled H-beam shapes.
 - a. Line Post: To match existing framework, typically 2.375 inches (60 mm) in diameter or 2.25 by 1.7 inches (57 by 43 mm).
 - b. End, Corner, and Pull Posts: To match existing framework, typically 2.875 inches (73 mm) in diameter or 2.25 by 1.7 inches (57 by 43 mm).
 3. Horizontal Framework Members: Intermediate, top, and bottom rails according to ASTM F 1043.
 - a. Top Rail: 1.66 inches (42 mm) in diameter.
 4. Brace Rails: ASTM F 1043.
 5. Metallic Coating for Steel Framework:
 - a. External, Type 2B: Zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. (0.27 kg/sq. m) of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film. Internal, Type D, consisting of 81 percent, not less than 0.3-mil- (0.0076-mm-) thick, zinc-pigmented coating.

2.3 SWING GATES

- A. General: ASTM F 900 for gate posts and single swing gate types.
1. Gate Leaf Width: As indicated.
 2. Framework Member Sizes and Strength: Based on gate fabric height as indicated.
- B. Pipe and Tubing:
1. Zinc-Coated Steel: ASTM F 1043 and ASTM F 1083; protective coating and finish to match fence framework.
 2. Gate Posts: Round tubular steel.
 3. Gate Frames and Bracing: Round tubular steel.
- C. Frame Corner Construction: Welded.
- D. Hardware:
1. Hinges: 180-degree outward swing.

2. Lock: See Specification 087100 "Door Hardware" for exit device requirements.
3. Closer: Manufacturer's standard.

2.4 FITTINGS

- A. Provide fittings according to ASTM F 626.
- B. Post Caps: Provide for each post as required based on replacement or addition.
 1. Provide line post caps with loop to receive tension wire or 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 (152 mm) long.
 2. Rail Clamps: Line and corner boulevard clamps for connecting intermediate and bottom rails to posts.
- E. Tension and Brace Bands: Pressed steel.
- F. Tension Bars: Steel, length not less than 2 inches (50 mm) shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.
- G. Barbed Wire Arms: As needed for arms that require replacement or need to be added. Pressed steel or cast iron, with clips, slots, or other means for attaching strands of barbed wire, integral with post cap, for each post unless otherwise indicated, and as follows:
 1. Provide line posts with arms that accommodate top rail or tension wire.
 2. Provide corner arms at fence corner posts unless extended posts are indicated.
 3. Single-Arm Type: Type I, slanted arm.
- H. 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, according to the following:
 - a. Hot-Dip Galvanized Steel: (3.76-mm-)galvanized coating thickness matching coating thickness of chain-link fence fabric.
- I. Finish:
 1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz./sq. ft. (366 g/sq. m) of zinc.
 - a. Polymer coating over metallic coating for tie wires, clips, and fasteners.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CHAIN-LINK FENCE INSTALLATION

- A. Install chain-link fencing according to ASTM F 567 and more stringent requirements specified.
- B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
- C. 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: For posts adjacent to pool deck, place top of concrete below grade as indicated on Drawings to allow covering with surface material.
 - b. Posts Set into Holes in Concrete: For posts located in landscape, form or core drill holes not less than 5 inches (127 mm) deep and 3/4 inch (20 mm) larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed according to anchoring material manufacturer's written instructions. Finish anchorage joint to slope away from post to drain water.
- D. Line Posts: As required for replacement or addition of line posts, space line posts uniformly to match existing, approximately 9'-2" (3 m)o.c.
- E. Post Bracing and Intermediate Rails: As required for replacement or addition of rails, install according to ASTM F 567, maintaining plumb position and alignment of fence posts. 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 (1830 mm) 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 fence posts. 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. Intermediate and Bottom Rails: Secure to posts with fittings.
- H. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 2-inch (50-mm) bottom clearance 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 (380 mm) 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 according to 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 (300 mm) o.c. and to braces at 24 inches (610 mm) o.c.
- K. Fasteners: Install nuts for tension bands and carriage bolts on the side of fence opposite the fabric side.

3.3 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.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests as required.

3.5 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. Lubricate hardware and other moving parts.

END OF SECTION 323113

SUPPLEMENTARY SPECIAL PROVISIONS
APPENDICES

APPENDIX A
NOTICE OF EXEMPTION

NOTICE OF EXEMPTION

(Check one or both)

TO: Recorder/County Clerk
P.O. Box 1750, MS A-33
1600 Pacific Hwy, Room 260
San Diego, CA 92101-2400

FROM: City of San Diego
Public Works Department
525 B Street, Suite 750, MS 908A
San Diego, CA 92101

Office of Planning and Research
1400 Tenth Street, Room 121
Sacramento, CA 95814

Project Name: Balboa Park Bud Kearns Aquatic Complex Improvements

WBS No.: S-17000.02.06

Project Location-Specific: 2229 Morley Field Drive, within Balboa Park Community Planning Area, Council District 3.

Project Location-City/County: San Diego/San Diego

Description of nature and purpose of the Project: This project includes the design and construction of aquatic center improvements at the Balboa Park Bud Kearns Aquatic Complex. Project features include mechanical system upgrades, fencing, Americans with Disabilities Act accessibility upgrades, pool decking, and pool coping. Additionally, a new surge tank will be installed within the existing lower level floors.

Name of Public Agency Approving Project: City of San Diego

Name of Person or Agency Carrying Out Project: City of San Diego Public Works
Contact: Gretchen Eichar, Senior Planner
Phone: 619-533-4110
525 B Street, San Diego, CA 92101

Exempt Status: (CHECK ONE)

- Ministerial (Sec. 21080(b)(1); 15268);
- Declared Emergency (Sec. 21080(b)(3); 15269(a));
- Emergency Project (Sec. 21080(b)(4); 15269 (b)(c))
- Categorical Exemption: Section 15301(a) and 15301(d) Existing Facilities; 15302 (c) Replacement or Reconstruction; and 15304 Minor Alterations to Land
- Statutory Exemption

Reasons why project is exempt: The City of San Diego conducted an environmental review which determined that the project meets the categorical exemption criteria set forth in CEQA State Guidelines Section 15301(a) and 15301(d) Existing Facilities, which allows for the operation, repair, maintenance, permitting, or minor alteration of existing public structures, facilities, and mechanical equipment, involving negligible or no expansion of existing or former use; 15302(c) Replacement or Reconstruction, which allows for the replacement or reconstruction of existing structures and facilities where the new structure will be located on the same site as the structure replaced and will have substantially the same size, purpose, and capacity as the structure replaced; and 15304 Minor Alterations to Land, which allows for minor public alterations in the condition of land which do not involve the removal of healthy, mature, scenic trees; and where the exceptions listed in Section 15300.2 would not apply. This project has been reviewed by the Historical Resources Board staff and determined to be consistent with the Secretary of the Interior Standards.

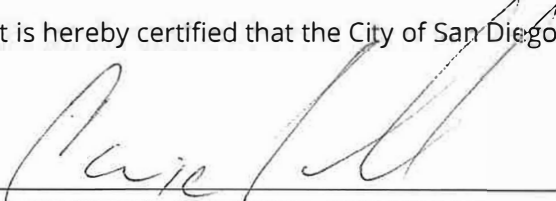
Lead Agency Contact Person: Gretchen Eichar

Telephone: (619) 533-4110

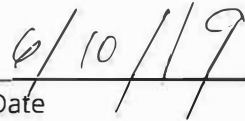
If filed by applicant:

1. Attach certified document of exemption finding.
2. Has a notice of exemption been filed by the public agency approving the project? () Yes () No

It is hereby certified that the City of San Diego has determined the above activity to be exempt from CEQA



Carrie Purcell, Assistant Deputy Director



Date

Check One:

- (X) Signed By Lead Agency
() Signed by Applicant

Date Received for Filing with County Clerk or OPR:

APPENDIX B
FIRE HYDRANT METER PROGRAM

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 1 OF 10	EFFECTIVE DATE October 15, 2002
	SUPERSEDES DI 55.27	DATED April 21, 2000

1. **PURPOSE**

1.1 To establish a Departmental policy and procedure for issuance, proper usage and charges for fire hydrant meters.

2. **AUTHORITY**

2.1 All authorities and references shall be current versions and revisions.

2.2 San Diego Municipal Code (NC) Chapter VI, Article 7, Sections 67.14 and 67.15

2.3 Code of Federal Regulations, Safe Drinking Water Act of 1986

2.4 California Code of Regulations, Titles 17 and 22

2.5 California State Penal Code, Section 498B.0

2.6 State of California Water Code, Section 110, 500-6, and 520-23

2.7 Water Department Director

Reference

2.8 State of California Guidance Manual for Cross Connection Programs

2.9 American Water Works Association Manual M-14, Recommended Practice for Backflow Prevention

2.10 American Water Works Association Standards for Water Meters

2.11 U.S.C. Foundation for Cross Connection Control and Hydraulic Research Manual

3. **DEFINITIONS**

3.1 **Fire Hydrant Meter:** A portable water meter which is connected to a fire hydrant for the purpose of temporary use. (These meters are sometimes referred to as Construction Meters.)

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- 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).

Water Department Director

- Tabs:
1. Fire Hydrant Meter Application
 2. Construction & Maintenance Related Activities With No Return To Sewer
 3. Notice of Discontinuation of Service

APPENDIX

Administering Division: Customer Support Division

Subject Index: Construction Meters
Fire Hydrant
Fire Hydrant Meter Program
Meters, Floating or Vehicle Mounted
Mobile Meter
Program, Fire Hydrant Meter

Distribution: DI Manual Holders



Application for Fire Hydrant Meter (EXHIBIT A)

(For Office Use Only)

NS REQ	FAC#
DATE	BY

METER SHOP (619) 527-7449

Meter Information

Application Date	Requested Install Date:
------------------	-------------------------

Fire Hydrant Location: (Attach Detailed Map//Thomas Bros. Map Location or Construction drawing.) Zip:	T.B.	G.B. (CITY USE)
Specific Use of Water:		
Any Return to Sewer or Storm Drain, if so, explain:		
Estimated Duration of Meter Use:	<input type="checkbox"/>	<input type="checkbox"/> Check Box if Reclaimed Water

Company Information

Company Name:			
Mailing Address:			
City:	State:	Zip:	Phone: ()
*Business license#		*Contractor license#	
A Copy of the Contractor's license OR Business License is required at the time of meter issuance.			
Name and Title of Billing Agent: <small>(PERSON IN ACCOUNTS PAYABLE)</small>			Phone: ()
Site Contact Name and Title:			Phone: ()
Responsible Party Name:			Title:
Cal ID#			Phone: ()
Signature:		Date:	
<small>Guarantees Payment of all Charges Resulting from the use of this Meter. Insures that employees of this Organization understand the proper use of Fire Hydrant Meter</small>			

Fire Hydrant Meter Removal Request	Requested Removal Date:
Provide Current Meter Location if Different from Above:	
Signature:	Title: Date:
Phone: ()	Pager: ()

<input type="checkbox"/> City Meter	<input type="checkbox"/> Private Meter	
Contract Acct #:	Deposit Amount: \$ 936.00	Fees Amount: \$ 62.00
Meter Serial #	Meter Size: 05	Meter Make and Style: 6-7
Backflow #	Backflow Size:	Backflow Make and Style:
Name:	Signature:	Date:

WATER USES WITHOUT ANTICIPATED CHARGES FOR RETURN TO SEWER

Auto Detailing
Backfilling
Combination Cleaners (Vactors)
Compaction
Concrete Cutters
Construction Trailers
Cross Connection Testing
Dust Control
Flushing Water Mains
Hydro Blasting
Hydro Seeing
Irrigation (for establishing irrigation only; not continuing irrigation)
Mixing Concrete
Mobile Car Washing
Special Events
Street Sweeping
Water Tanks
Water Trucks
Window Washing

Note:

1. If there is any return to sewer or storm drain, then sewer and/or storm drain fees will be charges.

Date

Name of Responsible Party
Company Name and Address
Account Number: _____

Subject: Discontinuation of Fire Hydrant Meter Service

Dear Water Department Customer:

The authorization for use of Fire Hydrant Meter # _____, located at *(Meter Location Address)* ends in 60 days and will be removed on or after *(Date Authorization Expires)*. Extension requests for an additional 90 days must be submitted in writing for consideration 30 days prior to the discontinuation date. If you require an extension, please contact the Water Department, or mail your request for an extension to:

City of San Diego
Water Department
Attention: Meter Services
2797 Caminito Chollas
San Diego, CA 92105-5097

Should you have any questions regarding this matter, please call the Fire Hydrant Hotline at (619) _____ - _____.

Sincerely,

Water Department

APPENDIX C

MATERIALS TYPICALLY ACCEPTED BY CERTIFICATE OF COMPLIANCE

MATERIALS TYPICALLY ACCEPTED BY CERTIFICATE OF COMPLIANCE

1. Soil amendment
2. Fiber mulch
3. PVC or PE pipe up to 16 inch diameter
4. Stabilizing emulsion
5. Lime
6. Preformed elastomeric joint seal
7. Plain and fabric reinforced elastomeric bearing pads
8. Steel reinforced elastomeric bearing pads
9. Waterstops (Special Condition)
10. Epoxy coated bar reinforcement
11. Plain and reinforcing steel
12. Structural steel
13. Structural timber and lumber
14. Treated timber and lumber
15. Lumber and timber
16. Aluminum pipe and aluminum pipe arch
17. Corrugated steel pipe and corrugated steel pipe arch
18. Structural metal plate pipe arches and pipe arches
19. Perforated steel pipe
20. Aluminum underdrain pipe
21. Aluminum or steel entrance tapers, pipe downdrains, reducers, coupling bands and slip joints
22. Metal target plates
23. Paint (traffic striping)
24. Conductors
25. Painting of electrical equipment
26. Electrical components
27. Engineering fabric
28. Portland Cement
29. PCC admixtures
30. Minor concrete, asphalt
31. Asphalt (oil)
32. Liquid asphalt emulsion
33. Epoxy

APPENDIX D

SAMPLE CITY INVOICE WITH CASH FLOW FORECAST

WBS #:	B18108
Date Submitted:	10/10/2018
NTP Date:	3/23/2018
Final Statement of WD Date:	5/23/2020
Contract #:	K-XX-XXXX-XXX-X
Contract Amount:	\$5,617,000

Construction Cash Flow Forecast
 "Sewer and Water Group Job 965 (W)"

Year	January	February	March	April	May	June	July	August	September	October	November	December
2018				15,000	25,000	52,000	52,000	100,000	10,000	100,000	100,000	100,000
2019	10,000	10,000	85,000	58,000	100,000	100,000	100,000	100,000	100,000	100,000	1,000,000	1,000,000
2020	100,000	100,000	100,000	1,000,000	1,000,000							
2021												
2022												
2023												
2024												
2025												

SAMPLE REFERENCE

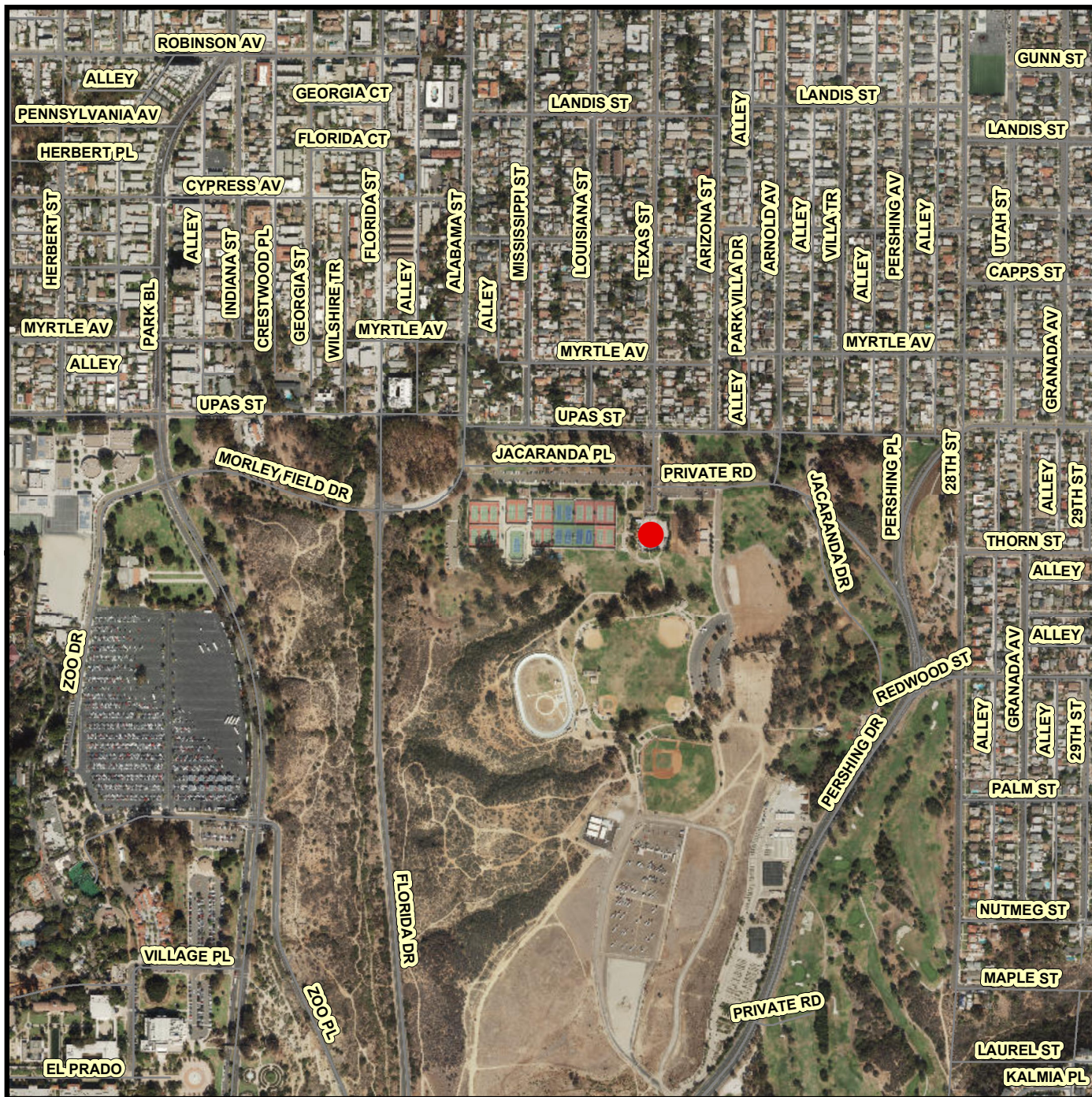
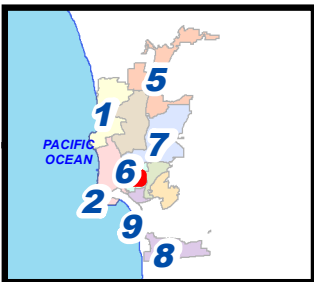
APPENDIX E
LOCATION MAP

BALBOA PARK BUD KEARNS AQUATIC COMPLEX

SENIOR ENGINEER
George Freiha
619-533-7449

PROJECT MANAGER
Michelle Garcia-Quilico
619-533-6635

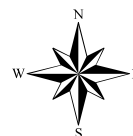
FOR QUESTIONS ABOUT THIS PROJECT
Call: 619-533-4207
Email: engineering@sandiego.gov



Legend

● Project Location

COMMUNITY NAME: Balboa Park



Date: September 28, 2017

COUNCIL DISTRICT: 03

SAP ID # S-17000

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APPENDIX F
HAZARDOUS LABEL/FORMS

HAZARDOUS WASTE

STATE AND FEDERAL LAW PROHIBITS IMPROPER DISPOSAL
IF FOUND, CONTACT THE NEAREST POLICE, OR PUBLIC SAFETY
AUTHORITY, OR THE U.S. ENVIRONMENTAL PROTECTION AGENCY
OR THE CALIFORNIA DEPARTMENT OF HEALTH SERVICES

GENERATOR NAME _____

ADDRESS _____ 24 HR. PHONE () _____

CITY _____ STATE _____ ZIP _____

EPA ID NO. _____ MANIFEST DOCUMENT NO. _____

EPA WASTE NO. _____ CA WASTE NO. _____ ACCUMULATION START DATE _____ / ____ / ____

CONTENTS, COMPOSITION _____

PROPER DOT SHIPPING NAME _____

TECHNICAL NAME (S) _____

UN/NA NO. WITH PREFIX _____

PHYSICAL STATE HAZARDOUS PROPERTIES FLAMMABLE TOXIC
 SOLID LIQUID CORROSIVE REACTIVE OTHER _____

HANDLE WITH CARE!
CONTAINS HAZARDOUS OR TOXIC WASTES

INCIDENT/RELEASE ASSESSMENT FORM ¹

If you have an emergency, Call 911

Handlers of hazardous materials are required to report releases. The following is a tool to be used for assessing if a release is reportable. Additionally, a non-reportable release incident form is provided to document why a release is not reported (see back).

Questions for Incident Assessment:

	YES	NO
1. Was anyone killed or injured, or did they require medical care or admitted to a hospital for observation?	<input type="checkbox"/>	<input type="checkbox"/>
2. Did anyone, other than employees in the immediate area of the release, evacuate?	<input type="checkbox"/>	<input type="checkbox"/>
3. Did the release cause off-site damage to public or private property?	<input type="checkbox"/>	<input type="checkbox"/>
4. Is the release greater than or equal to a reportable quantity (RQ)?	<input type="checkbox"/>	<input type="checkbox"/>
5. Was there an uncontrolled or unpermitted release to the air?	<input type="checkbox"/>	<input type="checkbox"/>
6. Did an uncontrolled or unpermitted release escape secondary containment, or extend into any sewers, storm water conveyance systems, utility vaults and conduits, wetlands, waterways, public roads, or off site?	<input type="checkbox"/>	<input type="checkbox"/>
7. Will control, containment, decontamination, and/or clean up require the assistance of federal, state, county, or municipal response elements?	<input type="checkbox"/>	<input type="checkbox"/>
8. Was the release or threatened release involving an unknown material or contains an unknown hazardous constituent?	<input type="checkbox"/>	<input type="checkbox"/>
9. Is the incident a threatened release (a condition creating a substantial probability of harm that requires immediate action to prevent, reduce, or mitigate damages to persons, property, or the environment)?	<input type="checkbox"/>	<input type="checkbox"/>
10. Is there an increased potential for secondary effects including fire, explosion, line rupture, equipment failure, or other outcomes that may endanger or cause exposure to employees, the general public, or the environment?	<input type="checkbox"/>	<input type="checkbox"/>

If the answer is YES to any of the above questions – report the release to the California Office of Emergency Services at 800-852-7550 and the local CUPA daytime: (619) 338-2284, after hours: (858) 565-5255. Note: other state and federal agencies may require notification depending on the circumstances.

Call 911 in an emergency

If all answers are NO, complete a Non Reportable Release Incident Form (page 2 of 2) and keep readily available. Documenting why a “no” response was made to each question will serve useful in the event questions are asked in the future, and to justify not reporting to an outside regulatory agency.

If in doubt, report the release.

¹ This document is a guide for accessing when hazardous materials release reporting is required by Chapter 6.95 of the California Health and Safety Code. It does not replace good judgment, Chapter 6.95, or other state or federal release reporting requirements.

NON REPORTABLE RELEASE INCIDENT FORM

1. RELEASE AND RESPONSE DESCRIPTION

Incident # _____

Date/Time Discovered	Date/Time Discharge	Discharge Stopped <input type="checkbox"/> Yes <input type="checkbox"/> No
Incident Date / Time:		
Incident Business / Site Name:		
Incident Address:		
Other Locators (Bldg, Room, Oil Field, Lease, Well #, GIS)		
Please describe the incident and indicate specific causes and area affected. Photos Attached?: <input type="checkbox"/> Yes <input type="checkbox"/> No		
Indicate actions to be taken to prevent similar releases from occurring in the future.		

2. ADMINISTRATIVE INFORMATION

Supervisor in charge at time of incident:	Phone:
Contact Person:	Phone:

3. CHEMICAL INFORMATION

Chemical	Quantity <input type="checkbox"/> GAL <input type="checkbox"/> LBS <input type="checkbox"/> FT ³
Chemical	Quantity <input type="checkbox"/> GAL <input type="checkbox"/> LBS <input type="checkbox"/> FT ³
Chemical	Quantity <input type="checkbox"/> GAL <input type="checkbox"/> LBS <input type="checkbox"/> FT ³
Clean-Up Procedures & Timeline:	
Completed By:	Phone:
Print Name:	Title:

EMERGENCY RELEASE FOLLOW - UP NOTICE REPORTING FORM

A	BUSINESS NAME	FACILITY EMERGENCY CONTACT & PHONE NUMBER () -	
B	INCIDENT DATE MO DAY YR	TIME OES NOTIFIED (use 24 hr time)	OES CONTROL NO.
C	INCIDENT ADDRESS LOCATION	CITY / COMMUNITY	COUNTY ZIP
D	CHEMICAL OR TRADE NAME (print or type)		CAS Number
D	CHECK IF CHEMICAL IS LISTED IN 40 CFR 355, APPENDIX A <input type="checkbox"/>	CHECK IF RELEASE REQUIRES NOTIFICATION UNDER 42 U.S.C. Section 9603 (a) <input type="checkbox"/>	
D	PHYSICAL STATE CONTAINED <input type="checkbox"/> SOLID <input type="checkbox"/> LIQUID <input type="checkbox"/> GAS	PHYSICAL STATE RELEASED <input type="checkbox"/> SOLID <input type="checkbox"/> LIQUID <input type="checkbox"/> GAS	QUANTITY RELEASED
D	ENVIRONMENTAL CONTAMINATION <input type="checkbox"/> AIR <input type="checkbox"/> WATER <input type="checkbox"/> GROUND <input type="checkbox"/> OTHER	TIME OF RELEASE	DURATION OF RELEASE — DAYS — HOURS — MINUTES
E	ACTIONS TAKEN		
F	KNOWN OR ANTICIPATED HEALTH EFFECTS (Use the comments section for addition information)		
	<input type="checkbox"/> ACUTE OR IMMEDIATE (explain) _____		
	<input type="checkbox"/> CHRONIC OR DELAYED (explain) _____		
	<input type="checkbox"/> NOTKNOWN (explain) _____		
G	ADVICE REGARDING MEDICAL ATTENTION NECESSARY FOR EXPOSED INDIVIDUALS		
H	COMMENTS (INDICATE SECTION (A - G) AND ITEM WITH COMMENTS OR ADDITIONAL INFORMATION)		
I	CERTIFICATION: I certify under penalty of law that I have personally examined and I am familiar with the information submitted and believe the submitted information is true, accurate, and complete.		
	REPORTING FACILITY REPRESENTATIVE (print or type) _____		
	SIGNATURE OF REPORTING FACILITY REPRESENTATIVE _____		DATE: _____

EMERGENCY RELEASE FOLLOW-UP NOTICE REPORTING FORM INSTRUCTIONS

GENERAL INFORMATION:

Chapter 6.95 of Division 20 of the California Health and Safety Code requires that written emergency release follow-up notices prepared pursuant to 42 U.S.C. § 11004, be submitted using this reporting form. Non-permitted releases of reportable quantities of Extremely Hazardous Substances (listed in 40 CFR 355, appendix A) or of chemicals that require release reporting under section 103(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 [42 U.S.C. § 9603(a)] must be reported on the form, as soon as practicable, but no later than 30 days, following a release. The written follow-up report is required in addition to the verbal notification.

BASIC INSTRUCTIONS:

- The form, when filled out, reports follow-up information required by 42 U.S.C § 11004. Ensure that all information requested by the form is provided as completely as possible.
- If the incident involves reportable releases of more than one chemical, prepare one report form for each chemical released.
- If the incident involves a series of separate releases of chemical(s) at different times, the releases should be reported on separate reporting forms.

SPECIFIC INSTRUCTIONS:

Block A: Enter the name of the business and the name and phone number of a contact person who can provide detailed facility information concerning the release.

Block B: Enter the date of the incident and the time that verbal notification was made to OES. The OES control number is provided to the caller by OES at the time verbal notification is made. Enter this control number in the space provided.

Block C: Provide information pertaining to the location where the release occurred. Include the street address, the city or community, the county and the zip code.

Block D: Provide information concerning the specific chemical that was released. Include the chemical or trade name and the Chemical Abstract Service (CAS) number. Check all categories that apply. Provide best available information on quantity, time and duration of the release.

Block E: Indicate all actions taken to respond to and contain the release as specified in 42 U.S.C. § 11004(c).

Block F: Check the categories that apply to the health effects that occurred or could result from the release. Provide an explanation or description of the effects in the space provided. Use Block H for additional comments/information if necessary to meet requirements specified in 42 U.S.C. § 11004(c).

Block G: Include information on the type of medical attention required for exposure to the chemical released. Indicate when and how this information was made available to individuals exposed and to medical personnel, if appropriate for the incident, as specified in 42 U.S.C. § 11004(c).

Block H: List any additional pertinent information.

Block I: Print or type the name of the facility representative submitting the report. Include the official signature and the date that the form was prepared.

MAIL THE COMPLETED REPORT TO:

**State Emergency Response Commission (SERC)
Attn: Section 304 Reports
Hazardous Materials Unit
3650 Schriever Avenue
Mather, CA 95655**

NOTE: Authority cited: Sections 25503, 25503.1 and 25507.1, Health and Safety Code. Reference: Sections 25503(b)(4), 25503.1, 25507.1, 25518 and 25520, Health and Safety Code.

APPENDIX G
INSPECTION REPORT ASBESTOS AND LEAD

**INSPECTION REPORT
ASBESTOS AND LEAD**

for

**BUD KEARNS AQUATIC COMPLEX, FACILITY 619
ACCESSIBILITY UPGRADE**

April 4, 2018

Prepared by:



Wm. Brad Blondet
Asbestos, Lead and Mold Program
Inspector
CA Asbestos Site Surveillance
Technician #99-2689
CDPH Lead IA/PM/S #5464

Reviewed by:



George Katsikaris
Asbestos, Lead and Mold Program
Manager
CA Asbestos Consultant #07-4265
CDPH Lead IA/PM #20618

City of San Diego
Environmental Services Department
Disposal and Environmental Protection Division
Asbestos, Lead & Mold Program
9601 Ridgehaven Court, Ste. 310
San Diego, CA 92123
Tel: (858) 492-5086
Fax: (858) 492-5041

1. Overview

An Inspector from the City of San Diego's Environmental Services Department, Asbestos, Lead and Mold Program (ALMP) performed an inspection of the Bud Kearns Aquatic Complex (facility 619) for asbestos and lead on February 28th and March 14th 2018.

The Bud Kearns Pool Facility is undergoing an update for accessibility upgrades and various improvements that will disturb some building components. Testing was limited to items listed on the demolition drawings and notes.

The ALMP Inspector that performed the inspection possesses a current State of California Division of Occupational Safety and Health (DOSH) Site Surveillance Technician credential, State of California Lead Inspector/Risk Assessor credential and has maintained his certificate for the Environmental Protection Agency (EPA) Asbestos Hazard Emergency Response Act (AHERA) Building Inspector course included in Attachment #3.

2. Laboratory Information

The City of San Diego contracts with the laboratories that are listed below. All samples collected as part of this inspection were submitted to and analyzed by either:

HM Pitt Labs, Inc.,
4901 Morena Blvd., Suite 203
San Diego, CA 92117
(619) 474-8548

LA Testing
520 Mission St.
Pasadena, CA 91030
(323)-254-9960

HM Pitt Labs, Inc. and LA Testing maintain accreditations for asbestos analysis under the National Voluntary Laboratory Accreditation Program (NVLAP) and the California Department of Public Health Service's Environmental Laboratory Accreditation Program (ELAP). Asbestos content analysis was conducted in accordance with methods specified in Appendix E, Subpart E, 40 CFR 763- "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" (EPA-600/M4-82-020 Dec. 1982) as Modified by "Method for the Determination of Asbestos in Bulk Building Materials" (EPA/600/R-93/116 July 1993).

3. Summary of Asbestos Containing Materials (ACM)

This inspection was conducted to identify any asbestos containing material that may be impacted as part of this PROJECT. All tested materials that are to be impacted as part of this PROJECT are negative for asbestos, as listed in Attachment #1.

Due to the non-destructive nature of the inspection some materials within interstitial spaces such as wall cavities, pipe chases and above ceilings may not have been tested. If suspect materials are encountered during PROJECT activities and are not listed in Attachment #1 of this report, work must stop immediately and the ALMP contacted so additional testing can be performed.

4. Summary of Lead Paint

Paint containing lead in excess of 1.0 mg/cm² is considered lead based paint. All lead based paint that is in deteriorated condition or to be impacted as a result of the PROJECT must be

removed by a certified lead abatement contractor prior to PROJECT activities. The City of San Diego's Lead Hazard Control Ordinance requires the use of Lead Safe Work Practices when disturbing paint that contains above 0.5 mg/cm².

The older wood building components at the Bud Kearns Aquatic Complex have lead based paint. Lead based paint is not to be disturbed without proper training and containment. In a public building all workers disturbing lead based paint shall be State Certified for performing lead abatement.

The summary below lists the areas of paint with greater than 1.0 mg/cm² lead. A complete list of components tested for lead can be found in Attachment A# 2 of this report.

Address	Location	Components	Condition	Reading
2229 Morley Field	Woman's Locker Room	Wood doors	Fair	3.4 mg/cm ²
2229 Morley Field	Woman's Locker Room	Wood door frames	Fair	4.0 mg/cm ²
2229 Morley Field	Men's Locker Room	Wood door frames	Fair	4.7 mg/cm ²
2229 Morley Field	Men's Locker Room	Wood walls	Fair	4.9 mg/cm ²
2229 Morley Field	Woman's Locker Room	Wood walls	Fair	1.2 mg/cm ²

5. Attachments

1. Asbestos Sample Logs and Laboratory Reports
2. Lead XRF Readings
3. Inspector Certifications
4. Site Diagram

Attachment # 1

ASBESTOS SAMPLE LOGS & LABORATORY REPORTS



H.M. Pitt Labs, Inc.
4901 Morena Blvd · Ste 203 · San Diego, CA 92117

Lab Number: 161390-221736
Tel: 619-474-8548 · Fax: 858-412-3305

Company:
City of San Diego Environmental Services
Department
9601 Ridgehaven Court, Suite 310
San Diego, CA 92123

Date Entered: 03/06/2018
Analyzed By: Michelle Lavallee

Date Analyzed: 03/06/18
Customer PO / Claim#:
Contract Number:

Job Site: Project No. 7502

Date Sampled: 02/28/2018
Who Sampled: Wm. Brad Blondet

Lab Notes: 72 HR TAT

POLARIZED LIGHT MICROSCOPY ANALYSIS REPORT - EPA-600/R-93/116 AND EPA-600/M4-82-020

Analysis Number: 161390-5
Customer Number: 7502-B-05
Classification:
Results: Non-Asbestos: Non-Fibrous Gray Pstucco
Description: Stucco, Exterior

Analysis Number: 161390-6
Customer Number: 7502-B-06
Classification:
Results: Non-Asbestos: Non-Fibrous Gray Pstucco
Description: Stucco, Exterior

Analysis Number: 161390-7
Customer Number: 7502-B-07
Classification:
Results: Non-Asbestos: Non-Fibrous Blue/Gray Texture
Description: Pool Coping, Texture Coatings, Pool

Analysis Number: 161390-8
Customer Number: 7502-B-08
Classification:
Results: Non-Asbestos: Non-Fibrous Blue/Gray Texture
Description: Pool Coping, Texture Coatings, Pool

- All samples tested as submitted to the lab. H.M. PITT LABS, INC. does not assume responsibility for the accuracy of the information submitted with the samples unless done by an employee of H.M. PITT LABS, INC.
- These test results relate only to the sample(s) identified above.
- This report may not be used to claim endorsement by NVLAP or any agency of the Federal Government.
- This report shall not be reproduced, except in full, without written approval of H.M. Pitt Labs, Inc.
- Samples are archived for 90 days from date of receipt and will be disposed of properly following this period.
- Quantitative value is based on PLM CVES (Calibrated Visual Estimates) with a detection limit of <1%.

APPROVED BY: 
LELAND S. PITT, CIH

Dated: 03/07/2018

REVIEWED BY: 
Michelle Lavallee



H.M. Pitt Labs, Inc.

4901 Morena Blvd · Ste 203 · San Diego, CA 92117

Lab Number: 161390-221736

Tel: 619-474-8548 · Fax: 858-412-3305

Company:

City of San Diego Environmental Services
Department
9601 Ridgehaven Court, Suite 310
San Diego, CA 92123

Date Entered: 03/06/2018

Analyzed By: Michelle Lavallee

Date Analyzed: 03/06/18

Customer PO / Claim#:

Contract Number:

Job Site: Project No. 7502

Date Sampled

Who Sampled

02/28/2018

Wm. Brad Blondet

Lab Notes: 72 HR TAT

POLARIZED LIGHT MICROSCOPY ANALYSIS REPORT - EPA-600/R-93/116 AND EPA-600/M4-82-020

Analysis Number: 161390-1

Customer Number: 7502-B-01

Classification:

Description: Wall Plaster, Interior

Results: Non-Asbestos: Non-Fibrous Gray Plaster

Analysis Number: 161390-2

Customer Number: 7502-B-02

Classification:

Description: Wall Plaster, Interior

Results: Non-Asbestos: Non-Fibrous White Plaster

Analysis Number: 161390-3

Customer Number: 7502-B-03

Classification:

Description: Wall Plaster, Interior

Results: Non-Asbestos: Non-Fibrous Gray Plaster

Analysis Number: 161390-4

Customer Number: 7502-B-04

Classification:

Description: Stucco, Exterior

Results: Non-Asbestos: Non-Fibrous Gray Pstucco

- All samples tested as submitted to the lab. H.M. PITT LABS, INC. does not assume responsibility for the accuracy of the information submitted with the samples unless done by an employee of H.M. PITT LABS, INC.
- These test results relate only to the sample(s) identified above.
- This report may not be used to claim endorsement by NVLAP or any agency of the Federal Government.
- This report shall not be reproduced, except in full, without written approval of H.M. Pitt Labs, Inc.
- Samples are archived for 90 days from date of receipt and will be disposed of properly following this period.
- Quantitative value is based on PLM CVES (Calibrated Visual Estimates) with a detection limit of <1%.

APPROVED BY:

LELAND S. PITT, CIH

Dated: 03/07/2018

REVIEWED BY:

Michelle Lavallee

Page 1 of 3



H.M. Pitt Labs, Inc.

4901 Morena Blvd · Ste 203 · San Diego, CA 92117

Lab Number: 161390-221736

Tel: 619-474-8548 · Fax: 858-412-3305

Company:

City of San Diego Environmental Services
Department
9601 Ridgehaven Court, Suite 310
San Diego, CA 92123

Date Entered: 03/06/2018

Analyzed By: Michelle Lavallee

Date Analyzed: 03/06/18

Customer PO / Claim#:

Contract Number:

Job Site: Project No. 7502

Date Sampled:

Who Sampled

Lab Notes: 72 HR TAT

02/28/2018

Wm. Brad Blondet

POLARIZED LIGHT MICROSCOPY ANALYSIS REPORT - EPA-600/R-93/116 AND EPA-600/M4-82-020

Analysis Number: 161390-9

Customer Number: 7502-B-09

Classification:

Description: Pool Coping, Texture Coatings, Pool

Results: Non-Asbestos: Non-Fibrous Blue/Gray Texture

- All samples tested as submitted to the lab. H.M. PITT LABS, INC. does not assume responsibility for the accuracy of the information submitted with the samples unless done by an employee of H.M. PITT LABS, INC.
- These test results relate only to the sample(s) identified above.
- This report may not be used to claim endorsement by NVLAP or any agency of the Federal Government.
- This report shall not be reproduced, except in full, without written approval of H.M. Pitt Labs, Inc.
- Samples are archived for 90 days from date of receipt and will be disposed of properly following this period.
- Quantitative value is based on PLM CVES (Calibrated Visual Estimates) with a detection limit of <1%.

APPROVED BY:

LELAND S. PITT, CIH

Dated: 03/07/2018

REVIEWED BY:

Michelle Lavallee

Page 3 of 3

Project # 7502	Submitted by: Wm. Brad Blondet	Date: 2 / 28 / 2018	Page 1 of 1
LAB SUBMITTED TO: H:M. Pitt Labs		TURNAROUND TIME: <input type="checkbox"/> 2 HOUR <input type="checkbox"/> 24 HOUR <input type="checkbox"/> 48 HOUR <input checked="" type="checkbox"/> 72 HOUR <input type="checkbox"/> 5 DAY <input type="checkbox"/> OTHER: _____	

The receiving Laboratory is required to complete the following:

1. All Invoices are to be sent to: *Attn. City of San Diego - Environmental Services Department, 9601 Ridgehaven Court, Suite 310 San Diego, CA 92123*
2. Lab reports/invoices are to contain the Project Number listed above. Do not include Purchase Order Numbers on Invoices
3. Email report to: WBlondet@sandiego.gov

Lab Number	Sample No.	Material/Location	Media	Time On/Off or Size	Flow (LPM)	Volume/ Area	Analyses Requested
Sample # Prefix	7502-B-01	Wall Plaster, Interior	Bulk				PLM
	7502-B-02	Wall Plaster, interior	Bulk				PLM
	7502-B-03	Wall Plaster, Interior	Bulk				PLM
	7502-B-04	Stucco, Exterior	Bulk				PLM
	7502-B-05	Stucco, Exterior	Bulk				PLM
	7502-B-06	Stucco, Exterior	Bulk				PLM
	7502-B-07	Pool Coping Texture Coatings, Pool	Bulk				PLM
	7502-B-08	Pool Coping Texture Coatings, Pool	Bulk				PLM
	7502-B-09	Pool Coping Texture Coatings, Pool	Bulk				PLM
NOTES:							

Relinquished by: _____	Relinquished by: _____
Date/Time: 3-6-18	Date/Time: 3-6-18
Received by: _____	Received by: _____
Date/Time: _____	Date/Time: _____



H.M. Pitt Labs, Inc.

4901 Morena Blvd · Ste 203 · San Diego, CA 92117

Lab Number: 161624-222138

Tel: 619-474-8548 · Fax: 858-412-3305

Company:

City of San Diego Environmental Services
Department
9601 Ridgehaven Court, Suite 310
San Diego, CA 92123

Date Entered: 03/16/2018
Analyzed By: Edina Zakar

Date Analyzed: 03/20/18
Customer PO / Claim#:
Contract Number:

Job Site: Project No. 7502

Date Sampled: 03/14/2018
Who Sampled: Wm. Brad Blondet

Lab Notes: 72 HRS

POLARIZED LIGHT MICROSCOPY ANALYSIS REPORT - EPA-600/R-93/116 AND EPA-600/M4-82-020

Analysis Number: 161624-1

Customer Number: 7502-B-10

Classification:

Description: Wall Plaster, Interior, Mechanical Room

Results: Non-Asbestos: Non-Fibrous Pink Plaster

Analysis Number: 161624-2

Customer Number: 7502-B-11

Classification:

Description: Wall Plaster, Interior, Mechanical Room

Results: Non-Asbestos: 2% Cellulose Fibers in Gray Plaster

Analysis Number: 161624-3

Customer Number: 7502-B-12

Classification:

Description: Wall Plaster, Interior, Mechanical Room

Results: Non-Asbestos: 1% Cellulose Fibers in White/Gray Plaster

- All samples tested as submitted to the lab. H.M. PITT LABS, INC. does not assume responsibility for the accuracy of the information submitted with the samples unless done by an employee of H.M. PITT LABS, INC.
- These test results relate only to the sample(s) identified above.
- This report may not be used to claim endorsement by NVLAP or any agency of the Federal Government.
- This report shall not be reproduced, except in full, without written approval of H.M. Pitt Labs, Inc.
- Samples are archived for 90 days from date of receipt and will be disposed of properly following this period.
- Quantitative value is based on PLM CVES (Calibrated Visual Estimates) with a detection limit of <1%.

APPROVED BY:

LELAND S. PITT, CH

Dated: 03/21/2018

REVIEWED BY:

Lee Pitt

Page 1 of 1

161624

Project # 7502 Submitted by: Wm. Brad Blondet Date: 3 / 14 /2018 Page 1 of 1

LAB SUBMITTED TO: H.M. Pitt Labs

TURNAROUND TIME: 2 HOUR 24 HOUR 48 HOUR 72 HOUR 5 DAY OTHER:

The receiving Laboratory is required to complete the following:

1. All invoices are to be sent to: *Attn. City of San Diego - Environmental Services Department, 9601 Ridgehaven Court, Suite 310 San Diego, CA 92123*
2. Lab reports/invoices are to contain the Project Number listed above. Do not include Purchase Order Numbers on Invoices
3. Email report to: WBlondet@sandiego.gov

Lab Number	Sample No.	Material/Location	Media	Time On/Off or Size	Flow (LPM)	Volume/ Area	Analyses Requested
	7502-B-10	Wall Plaster, Interior, Mechanical Room	Bulk				PLM
	7502-B-11	Wall Plaster, Interior, Mechanical Room	Bulk				PLM
	7502-B-12	Wall Plaster, Interior, Mechanical Room	Bulk				PLM

NOTES:

Date/Time: 3/14/2018	Relinquished by: [Signature]
Received by: [Signature]	Date/Time: 3/16/18
Date/Time: 3/16/18	Received by: [Signature]
Relinquished by: [Signature]	Date/Time: 3/16/18 11:10
3/16/18	3/16/18 11:10



H.M. Pitt Labs, Inc.

4901 Morena Blvd · Ste 203 · San Diego, CA 92117

Lab Number: 162129-222997

Tel: 619-474-8548 · Fax: 858-412-3305

Company:

City of San Diego Environmental Services
Department
9601 Ridgehaven Court, Suite 310
San Diego, CA 92123

Date Entered: 04/11/2018

Analyzed By: Michelle Lavallee

Date Analyzed: 04/12/18

Customer PO / Claim#:

Contract Number:

Job Site: Project # 7502

Date Sampled

Who Sampled

Lab Notes: 72-hr TAT

04/09/2018

Wm. Brad Blondet

POLARIZED LIGHT MICROSCOPY ANALYSIS REPORT - EPA-600/R-93/116 AND EPA-600/M4-82-020

Analysis Number: 162129-1

Customer Number: 7502-B-13

Classification:

Description: Roof Over Mechanical/Boiler, Core Rolled Roofing

Results: Non-Asbestos: 10% Glass Fibers and 15% Cellulose Fibers in Black Roofing Material

Analysis Number: 162129-2

Customer Number: 7502-B-14

Classification:

Description: Roof Over Mechanical/Boiler, Core Rolled Roofing

Results: Non-Asbestos: 10% Glass Fibers and 15% Cellulose Fibers in Black Roofing Material

Analysis Number: 162129-3

Customer Number: 7502-B-15

Classification:

Description: Roof Over Mechanical/Boiler, Core Rolled Roofing

Results: Non-Asbestos: 10% Glass Fibers and 15% Cellulose Fibers in Black Roofing Material

Analysis Number: 162129-4

Customer Number: 7502-B-16

Classification:

Description: Roof Over Mechanical/Boiler, Penetration Mastic

Results: Non-Asbestos: 3% Cellulose Fibers in Black Penetration Mastic

- All samples tested as submitted to the lab. H.M. PITT LABS, INC. does not assume responsibility for the accuracy of the information submitted with the samples unless done by an employee of H.M. PITT LABS, INC.
- These test results relate only to the sample(s) identified above.
- This report may not be used to claim endorsement by NVLAP or any agency of the Federal Government.
- This report shall not be reproduced, except in full, without written approval of H.M. Pitt Labs, Inc.
- Samples are archived for 90 days from date of receipt and will be disposed of properly following this period.
- Quantitative value is based on PLM CVES (Calibrated Visual Estimates) with a detection limit of <1%.

APPROVED BY:

LELANO S. PITT, CH

Date: 04/16/2018

REVIEWED BY:

Page 1 of 2



H.M. Pitt Labs, Inc.

4901 Morena Blvd · Ste 203 · San Diego, CA 92117

Lab Number: 162129-222997

Tel: 619-474-8548 · Fax: 858-412-3305

Company:

City of San Diego Environmental Services
Department
9601 Ridgehaven Court, Suite 310
San Diego, CA 92123

Date Entered: 04/11/2018**Analyzed By:** Michelle Lavallee**Date Analyzed:** 04/12/18**Customer PO / Claim#:****Contract Number:****Job Site:** Project # 7502**Date Sampled****Who Sampled****Lab Notes:** 72-hr TAT

04/09/2018

Wm. Brad Blondet

POLARIZED LIGHT MICROSCOPY ANALYSIS REPORT - EPA-600/R-93/116 AND EPA-600/M4-82-020

Analysis Number: 162129-5**Customer Number:** 7502-B-17**Classification:****Description:** Roof Over Mechanical/Boiler, Penetration Mastic**Results:** Non-Asbestos: 3% Cellulose Fibers in Black Penetration Mastic**Analysis Number:** 162129-6**Customer Number:** 7502-B-18**Classification:****Description:** Roof Over Mechanical/Boiler, Penetration Mastic**Results:** Non-Asbestos: 3% Cellulose Fibers in Black Penetration Mastic

- All samples tested as submitted to the lab. H.M. PITT LABS, INC. does not assume responsibility for the accuracy of the information submitted with the samples unless done by an employee of H.M. PITT LABS, INC.
- These test results relate only to the sample(s) identified above.
- This report may not be used to claim endorsement by NVLAP or any agency of the Federal Government.
- This report shall not be reproduced, except in full, without written approval of H.M. Pitt Labs, Inc.
- Samples are archived for 90 days from date of receipt and will be disposed of properly following this period.
- Quantitative value is based on PLM CVES (Calibrated Visual Estimates) with a detection limit of <1%.

APPROVED BY:

LELAND S. PITT, CIH

Dated: 04/16/2018**REVIEWED BY:**

Page 2 of 2

Lab # 162129

Project # 7502 Submitted by: Wm. Brad Blondet Date: 4 / 9 /2018 Page 1 of 1

LAB SUBMITTED TO: H.M. Pitt Labs

TURNAROUND TIME: 2 HOUR 24 HOUR 48 HOUR 72 HOUR 5 DAY OTHER:

The receiving Laboratory is required to complete the following:

1. All Invoices are to be sent to: *Attn. City of San Diego - Environmental Services Department, 9601 Ridgehaven Court, Suite 310 San Diego, CA 92123*
2. Lab reports/invoices are to contain the Project Number listed above. Do not include Purchase Order Numbers on Invoices
3. Email report to: WBlondet@sandiego.gov

Lab Number	Sample No.	Material/Location	Media	Time On/Off or Size	Flow (LPM)	Volume/Area	Analyses Requested
	7502-B-13	Roof over mechanical/boiler, core rolled roofing	Bulk				PLM
	7502-B-14	Roof over mechanical/boiler, core rolled roofing	Bulk				PLM
	7502-B-15	Roof over mechanical/boiler, core rolled roofing	Bulk				PLM
	7502-B-16	Roof over mechanical/boiler, penetration mastic	Bulk				PLM
	7502-B-17	Roof over mechanical/boiler, penetration mastic	Bulk				PLM
	7502-B-18	Roof over mechanical/boiler, penetration mastic	Bulk				PLM

NOTES:

Relinquished by: _____	Relinquished by: _____
Date/Time: 4/11/18 11:24	Date/Time: _____
Received by: _____	Received by: _____
Date/Time: 4/11/18 11:24	Date/Time: _____

Attachment # 2

LEAD XRF RESULTS

City of San Diego
Asbestos Lead, and Mold Program

Project 7502, Bud Kearns Pool Renovation, Facility 619

XRF Assay Results

Reading No	Time	Type	Location	Room	Side	Component	COND.	SUBST.	Color	Results	PbC	Units
1	2/28/18 10:51	Paint	K & L			CALIB. CHECK			RED	Negative	0.9	mg / cm ^2
2	2/28/18 10:54	Paint	K & L			CALIB. CHECK			RED	Positive	1.1	mg / cm ^2
3	2/28/18 10:56	Paint	K & L			CALIB. CHECK			RED	Positive	1	mg / cm ^2
4	2/28/18 15:00	Paint	BUD KEARNS POOL	WOMEN'S LOCKER ROOM	B	WALL	INTACT	PLASTER	TAN	Negative	0.01	mg / cm ^2
5	2/28/18 15:01	Paint	BUD KEARNS POOL	WOMEN'S LOCKER ROOM	B	DOORS	INTACT	WOOD	BLUE	Positive	3.4	mg / cm ^2
6	2/28/18 15:02	Paint	BUD KEARNS POOL	WOMEN'S LOCKER ROOM	B	DOORS FRAME	INTACT	WOOD	BLUE	Positive	4	mg / cm ^2
7	2/28/18 15:03	Paint	BUD KEARNS POOL	WOMEN'S LOCKER ROOM	A	WALL	INTACT	PLASTER	TAN	Negative	0.06	mg / cm ^2
8	2/28/18 15:06	Paint	BUD KEARNS POOL	WOMEN'S LOCKER ROOM	A	WALL TILE	INTACT	PLASTER	TAN	Negative	0.03	mg / cm ^2
9	2/28/18 15:07	Paint	BUD KEARNS POOL	WOMEN'S LOCKER ROOM	A	SEAT	INTACT	WOOD	BLUE	Negative	0	mg / cm ^2
10	2/28/18 15:08	Paint	BUD KEARNS POOL	WOMEN'S LOCKER ROOM	A	WALL	INTACT	PLASTER	TAN	Negative	0.02	mg / cm ^2
11	2/28/18 15:10	Paint	BUD KEARNS POOL	WOMEN'S LOCKER ROOM	A	DOOR	INTACT	WOOD	BLUE	Negative	0.01	mg / cm ^2
12	2/28/18 15:11	Paint	BUD KEARNS POOL	MEN'S LOCKER ROOM	A	DOOR FRAME	INTACT	WOOD	BLUE	Positive	4.7	mg / cm ^2
13	2/28/18 15:12	Paint	BUD KEARNS POOL	MEN'S LOCKER ROOM	A	WALL TILE	INTACT	CERAMIC	BLUE	Negative	0.05	mg / cm ^2
14	2/28/18 15:13	Paint	BUD KEARNS POOL	MEN'S LOCKER ROOM	A	SEAT	INTACT	WOOD	BLUE	Negative	0	mg / cm ^2
15	2/28/18 15:14	Paint	BUD KEARNS POOL	MEN'S LOCKER ROOM	A	WALL	INTACT	PLASTER	TAN	Negative	0	mg / cm ^2
16	2/28/18 15:16	Paint	BUD KEARNS POOL	EXTERIOR	A	POOL COPING	INTACT	PLASTER	BLUE	Negative	0.3	mg / cm ^2
17	2/28/18 15:17	Paint	BUD KEARNS POOL	EXTERIOR	A	POOL COPING	INTACT	PLASTER	BLUE	Negative	< LOD	mg / cm ^2
18	2/28/18 15:17	Paint	BUD KEARNS POOL	EXTERIOR	A	POOL COPING	INTACT	PLASTER	BLUE	Negative	0.3	mg / cm ^2
19	2/28/18 15:35	Paint				CALIB. CHECK			RED	Positive	1	mg / cm ^2
20	2/28/18 15:37	Paint				CALIB. CHECK			RED	Positive	1	mg / cm ^2
21	2/28/18 15:37	Paint				CALIB. CHECK			RED	Positive	1	mg / cm ^2
22	3/14/18 11:38	ShutterCal									2.05	
23	3/14/18 11:42	Paint				CALIB. CHECK			RED	Negative	0.8	mg / cm ^2
24	3/14/18 11:45	Paint				CALIB. CHECK			RED	Negative	0.9	mg / cm ^2
25	3/14/18 11:47	Paint				CALIB. CHECK			RED	Negative	0.9	mg / cm ^2
26	3/14/18 11:53	Paint	BUD KEARNS POOL	MECHANICAL ROOM	B	WALL	POOR	CONCRETE	WHITE	Negative	0	cps
27	3/14/18 11:54	Paint	BUD KEARNS POOL	MECHANICAL ROOM	A	WALL	POOR	CONCRETE	WHITE	Negative	0	mg / cm ^2
28	3/14/18 11:54	Paint	BUD KEARNS POOL	MECHANICAL ROOM	D	WALL	POOR	CONCRETE	WHITE	Negative	0	mg / cm ^2
29	3/14/18 11:56	Paint	BUD KEARNS POOL	MECHANICAL ROOM	A	STEEL COLUMNS	POOR	METAL	NON PAINTED	Negative	0.08	mg / cm ^2
30	3/14/18 11:59	Paint	BUD KEARNS POOL	MECHANICAL ROOM	A	PUMP BASE	POOR	CONCRETE	BROWN	Negative	0.18	mg / cm ^2
31	3/14/18 12:00	Paint	BUD KEARNS POOL	MECHANICAL ROOM	A	PLATFORM GRATE	POOR	METAL	BROWN	Negative	0	mg / cm ^2
32	3/14/18 12:01	Paint	BUD KEARNS POOL	MECHANICAL ROOM	A	PUMP	POOR	METAL	BLUE	Negative	0	mg / cm ^2
33	3/14/18 12:02	Paint	BUD KEARNS POOL	MECHANICAL ROOM	A	ELECTRICAL PANEL	POOR	WOOD	SILVER	Negative	0	mg / cm ^2
34	3/14/18 12:03	Paint	BUD KEARNS POOL	MECHANICAL ROOM	A	I BEAM COLUMN	POOR	METAL	SILVER	Negative	0.07	mg / cm ^2
35	3/14/18 12:06	Paint	BUD KEARNS POOL	EXTERIOR	A	STEAMBOILER	POOR	METAL	GREEN	Negative	0.08	mg / cm ^2
36	3/14/18 12:14	Paint	BUD KEARNS POOL	MENS LOCKER ROOM	A	WALL	FAIR	WOOD	WHITE	Positive	4.9	mg / cm ^2
37	3/14/18 12:15	Paint	BUD KEARNS POOL	MENS LOCKER ROOM	A	BENCH	FAIR	CONCRETE	GREEN	Negative	0.01	mg / cm ^2
38	3/14/18 12:16	Paint	BUD KEARNS POOL	MENS LOCKER ROOM	A	AWNING HEADER	FAIR	WOOD	WHITE	Negative	0.07	mg / cm ^2
39	3/14/18 12:20	Paint	BUD KEARNS POOL	WOMANS LOCK ROOM	A	BENCH	FAIR	WOOD	GREEN	Negative	0	mg / cm ^2
40	3/14/18 12:21	Paint	BUD KEARNS POOL	WOMANS LOCK ROOM	A	BRACKET	FAIR	METAL	TAN	Negative	0.06	mg / cm ^2
41	3/14/18 12:22	Paint	BUD KEARNS POOL	WOMANS LOCK ROOM	A	WALL	FAIR	WOOD	TAN	Positive	1.2	mg / cm ^2

Inspector: Wm. Brad Blondet
CDPH Inspector/Assessor # 5464

Niton XLP303A Serial # 7902
Testing for Demolition/Renovation

Page 1 of 2

City of San Diego
Asbestos Lead, and Mold Program

Project 7502, Bud Kearns Pool Renovation, Facility 619

XRF Assay Results

Reading No	Time	Type	Location	Room	Side	Component	COND.	SUBST.	Color	Results	PbC	Units
42	3/14/18 12:30	Paint	BUD KEARNS POOL	EXTERIOR	B	CURB	INTACT	CONCRETE	RED	Negative	0.4	mg / cm ^2
43	3/14/18 12:34	Paint				CALIB. CHECK			RED	Negative	0.9	mg / cm ^2
44	3/14/18 12:38	Paint				CALIB. CHECK			RED	Positive	1	mg / cm ^2
45	3/14/18 12:47	Paint				CALIB. CHECK			RED	Negative	0.9	mg / cm ^2

Inspector: Wm. Brad Blondet
CDPH Inspector/Assessor # 5464

Niton XLp303A Serial # 7902
Testing for Demolition/Renovation

Attachment # 3

INSPECTOR CERTIFICATIONS

State of California
Division of Occupational Safety and Health
Certified Site Surveillance Technician

William Bradley Blondet




Name

Certification No. **99-2689**

Expires on **12/10/18**

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7160 et seq. of the Business and Professions Code.

State of California Department of Public Health

Lead-Related Construction Certificate	Certificate Type	Expiration Date
	Inspector/Assessor	07/01/2018
	Supervisor	07/01/2018
	Project Monitor	07/01/2018

William B. Blondet ID # 5464

Certificate of Training

This is to certify that

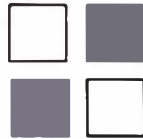
William Blondet

has successfully completed 4 hours of formal training entitled

AHERA Building Inspector Refresher

as approved by the California Division of Occupational Safety and Health
and as certified by the Environmental Protection Agency and approved by AHERA under TSCA Title II

Presented by



Design For Health Training Center

2667 Camino del Rio South, Suite #207

San Diego, CA 92108

Phone: (619) 291-1777 Fax: (619) 291-4318

dfhtcsd@gmail.com

www.designforhealthtrainingcenter.com

By:

Virginia L. Shefa B.S., M.N., Sc., CAC
President

DOSH Approval #011-06
Certificate # 0917BIR183453
Course Date(s) 09/06/2017
Exam Date: N/A

This is an annual certification. It must be renewed by: 09/06/2018

APPENDIX H
SAMPLE OF PUBLIC NOTICE



CONSTRUCTION NOTICE

PROJECT TITLE

Work on your street will begin within one week to replace the existing water mains servicing your community.

The work will consist of:

- Saw-cutting and trench work on Ingulf Street from Morena Boulevard to Galveston Street to install new water mains, water laterals and fire hydrants.
• Streets where trenching takes place will be resurfaced and curb ramps will be upgraded to facilitate access for persons with disabilities where required.
• This work is anticipated to be complete in your community by December 2016.

How your neighborhood may be impacted:

- Water service to some properties during construction will be provided by a two-inch highline pipe that will run along the curb. To report a highline leak call 619-515-3525.
• Temporary water service disruptions are planned. If planned disruptions impact your property, you will receive advance notice.
• Parking restrictions will exist because of the presence of construction equipment and materials.
• "No Parking" signs will be displayed 72 hours in advance of the work.
• Cars parked in violation of signs will be TOWED.

Hours and Days of Operation:

Monday through Friday X:XX AM to X:XX PM.

City of San Diego Contractor:

Company Name, XXX-XXX-XXXX



CONSTRUCTION NOTICE

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Work on your street will begin within one week to replace the existing water mains servicing your community.

The work will consist of:

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Hours and Days of Operation:

Monday through Friday X:XX AM to X:XX PM.

City of San Diego Contractor:

Company Name, XXX-XXX-XXXX

To contact the City of San Diego: SD Public Works 619-533-4207 | engineering@sandiego.gov | sandiego.gov/CIP

To contact the City of San Diego: SD Public Works 619-533-4207 | engineering@sandiego.gov | sandiego.gov/CIP

APPENDIX I
COMPILED CUT SHEETS

CUT SHEETS FOR:

**BUD KEARNS
AQUATIC COMPLEX IMPROVEMENTS**

2229 MORLEY FIELD DRIVE, SAN DIEGO, CA 92104

PREPARED FOR:

CITY OF SAN DIEGO PUBLIC WORKS DEPARTMENT

100% DESIGN SUBMITTAL

APRIL 23, 2018

PLATT/WHITELAW ARCHITECTS, INC.
4034 30TH STREET, SAN DIEGO, CALIFORNIA 92104
619 546-4326





THE LOCKER ROOM

- [Request a Quote](#)
- [Lockers](#)
- [Benches/Stools](#)
- [Pedestals/Brackets](#)
- [Locks](#)
- [Repair Parts](#)
- [FAQ](#)

THE RESTROOM

- [Request a Quote](#)
- [Toilet Partitions](#)
- [Bathroom Accessories](#)
- [Shower Stalls](#)
- [Dressing Compartments](#)
- [FAQ](#)

THE WAREHOUSE

- [Request a Quote](#)
- [Shelving and Rack](#)
- [Mezzanine](#)
- [Wire Partitions](#)
- [Industrial Stairs](#)
- [Barrier Rail](#)
- [In Plant Offices](#)
- [FAQ](#)

ADA Locker Bench with Back Support

Now: \$367.00



[Back to List](#)

SKU: WBLBSADA

Qty:

sizes:

- 20" x 42" (STOCK) (\$352.00)
- 24" x 42" (STOCK) (\$378.00)
- 20" x 48" (STOCK) (\$373.00)
- 24" x 48" (STOCK) (\$367.00)
- 20" x 60" (7-10 days) (\$465.00)
- 24" x 60" (7-10 days) (\$402.00)
- 20" x 72" 3 Frms (7-10 days) (\$540.00)
- 24" x 72" 3 Frms (7-10 days) (\$500.00)

[Add to Cart](#)

[Email a Friend](#)

Some Sizes IN STOCK

Easy to assemble and meets ADA requirement. The 1.25" thick standard locker room bench is made from face-glued hardwood strips. Sturdy and smooth sanded surface provides a high-quality appearance. A two-coat catalyzed finish provides protection from spills and drips. All edges sport a radius cut for comfort and safety. Kit with 18" H backrest and 2-part almond pedestals. Must be floor mounted.

ADA and so-called "Barrier Free" guidelines are set by the Federal Government and are sometimes modified by regional or local, lower level government agencies. Please check with your architect or these agencies to confirm that this product applies to your guidelines.

Color: Almond

FOR EASY ASSEMBLY, PILOT HOLES ARE PRE-DRILLED INTO BENCH SEAT AND BACK

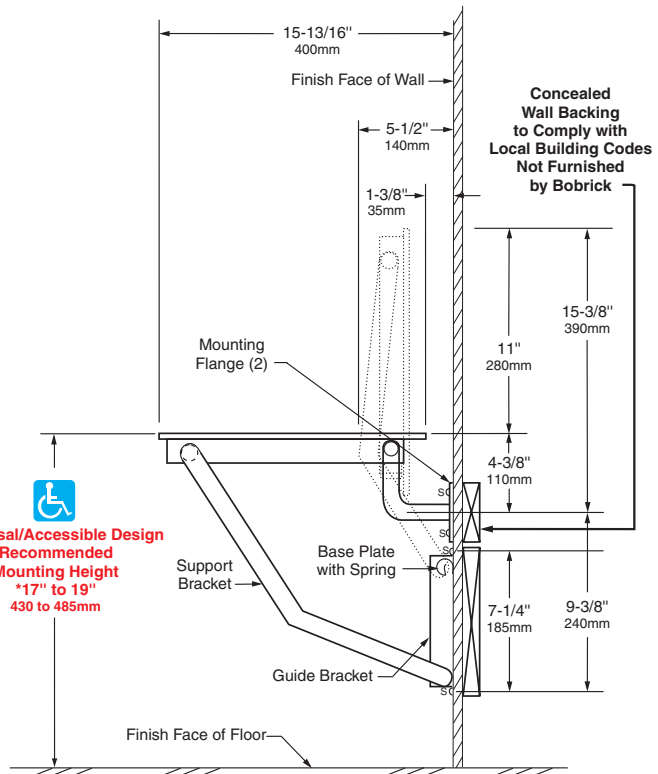
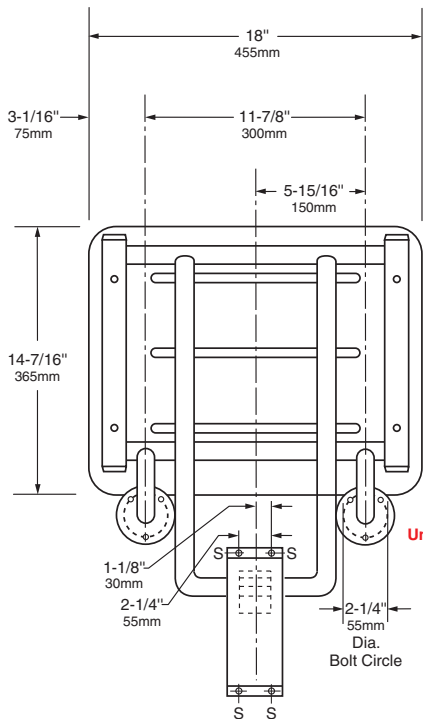
Color	Almond Pedestals
Height	1.25" standard thickness
Seat Height	18" High
Assembly	Some Assembly Required
Quick Ship	Some sizes
Shipping Class	70
UP Sable	No
Packaging	Carton
Floor Anchors	Not Included
Mounting Hardware	Included to mount seat/bracket to pedestal



Technical Data

SOLID PHENOLIC FOLDING SHOWER/DRESSING AREA SEAT

B-5191



 **Universal/Accessible Design Recommended Mounting Height *17" to 19" 430 to 485mm**

*Consult local building codes

MATERIALS:

Seat — One-piece, 5/16" (8mm) thick, solidly fused plastic laminate with matte-finish melamine surfaces, ivory-colored face sheets, and black phenolic-resin core that are integrally bonded — cannot delaminate. Integral slots for water drainage. Secured to frame with stainless steel carriage bolts and acorn nuts.

Frame — 18-8, type-304, stainless steel with satin finish. 16-gauge (1.6mm), 1-1/4" (30mm) square tubing and 18-gauge (1.2mm), 1" (25mm) diameter seamless tubing.

Mounting Flanges (2) — 18-8, type-304, 3/16" (5mm) thick stainless steel with satin finish. 3" (75mm) diameter with three mounting screw holes.

Baseplate — 18-8, type-304, heavy-gauge stainless steel.

Spring — 17-7, type-301, 24-gauge (0.6mm) stainless steel. Spot-welded to baseplate.

Guide Bracket — 18-8, type-304, 16-gauge (1.6mm) stainless steel with satin finish.

continued . . .

OPERATION:

Shower seat can be folded up against the wall when not in use. The spring at the top of baseplate locks seat into upright position until released by pulling the top of seat away from wall. Support system with guide bracket allows varying mounting heights and leaves floor clear for easier cleaning. Nonporous solid phenolic seat has slots to permit water to drain, does not splinter or require oiling, and will not support growth of bacteria. Slotless round-head carriage bolts and acorn nuts provide additional safety to user. Bobrick shower seats, when properly installed, have sufficient strength to support 500 lbs., (227 kg) complying with accessible design guidelines (including ADAAG in the U.S.A.).

INSTALLATION:

Secure unit to wall at points indicated by an S, with the two mounting flanges located at top and the baseplate and guide bracket below. The bottom of support bracket must be positioned between the baseplate and guide bracket before they are secured to wall or partition. Mounting height of shower seat must comply with local building codes.

For stud walls, provide concealed backing to comply with local building codes and secure with #14 x 2-1/2" (6.3 x 65mm) stainless steel sheet-metal screws furnished by manufacturer.

For prefabricated shower stalls, provide adequate backing by the shower stall manufacturer. Secure with #14 x 2-1/2" (6.3 x 65mm) stainless steel mounting screws furnished by manufacturer. Bobrick offers a mounting kit for installing shower seats. For additional mounting kits please order 252-30. One mounting kit is required for each flange.

For masonry walls, provide fiber plugs or expansion shields for use with furnished sheet-metal screws, or provide 1/4" (6mm) toggle bolts or expansion bolts.

INSTALL SAFETY PLATE TO WALL:

Safety Plate is to be mounted on wall near Shower Seat in order to properly advise users of the Seat's weight restrictions. Correct installation of the Safety Plate will ensure that the Shower Seat meets A.N.S.I. Standards.

Permanently affix Safety Plate to wall on either side of the Shower Seat at a minimum height of 30" (760mm). If mounted above Seat, the Plate must be high enough so that it is not covered when Seat is on the up position. Mounting screws (4) are recommended, but double-sided tape on rear of Plate may be used for very smooth, non-porous surfaces.

SAFETY WARNING: Shower seats are no stronger than the anchors and walls to which they are attached and must be firmly secured in order to support the loads for which they are intended. Consult and comply with local building codes. To avoid potential injury, the building owner or maintenance personnel should remove the shower seat from service if the shower seat is not adequately secured to the wall. Unit shall support static loads of up to 500 lbs (227 kg) when properly installed and used. To avoid potential seat malfunction, DO NOT use seat if weight exceeds 500 lbs (227 kg).

SPECIFICATION:

Folding shower seat shall have a frame constructed of type-304, satin-finish stainless steel that consists of 16-gauge (1.6mm), 1-1/4" (30mm) square tubing and 18-gauge (1.2mm), 1" (25mm) diameter seamless tubing. Seat shall be one-piece, 5/16" (8mm) thick, solidly fused plastic laminate with matte-finish melamine surfaces, ivory-colored face sheets, and black phenolic-resin core; secured to frame with stainless steel carriage bolts and acorn nuts. Shower seat shall be equipped with two 3" (75mm) diameter mounting flanges constructed of type-304, 3/16" (5mm) thick, satin-finish stainless steel; a guide bracket constructed of type-304, 16-gauge (1.6mm), satin-finish stainless steel; and a spring constructed of type-301, 24-gauge (0.6mm) stainless steel that is spot-welded to a baseplate of type-304, heavy-gauge stainless steel. Seat shall be able to lock in upright position when not in use. Shower seat shall comply with accessible design guidelines (including ADAAG in the U.S.A.).

Folding Shower Seat shall be Model B-5191 of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

The manufacturer reserves the right to, and does from time to time, make changes and improvements in designs and dimensions.

B-5191 r08/09/13

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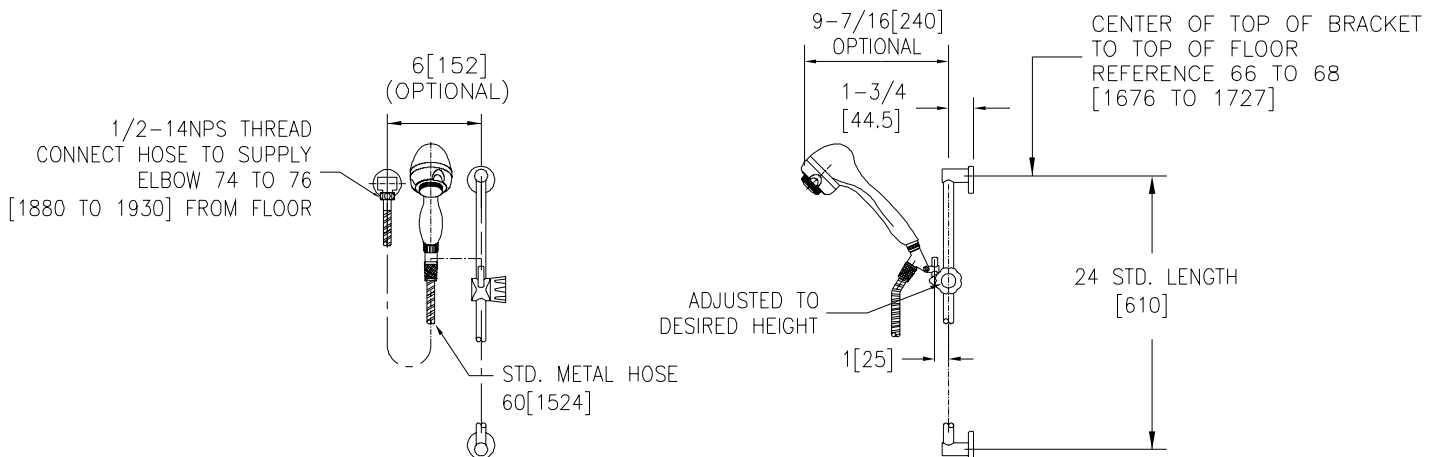


TEMP-GARD HAND/WALL SHOWER W/ SUPPLY ELBOW & FLANGE

Z7000-HW-H7

TAG _____

ENGINEERING SPECIFICATIONS: ZURN Z7000-HW-H7 Hand/wall shower unit consisting of hand held shower head with swivel connection, 60" flexible metal hose, 24" mounting bar wall connection, with supply elbow & flange. Hand held shower head with pressure compensating 2.0 GPM flow control and spray adjustment.



Note: All dimensions are for reference only. Do not use for pre-plumbing

OPTIONAL ACCESSORIES

Suffix	Description
NA	

STANDARDS

Tested to the following standards:
Meets or exceeds ANSI A112.18.1M

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Rev.
Dwg. No. 92698

C.N. No. 107201
Date: 3/31/08 Product No. Z7000-HW-H7

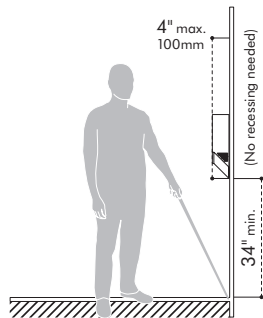
ZURN INDUSTRIES, LLC ♦ COMMERCIAL BRASS OPERATION ♦ 2640 SOUTH WORK STREET ♦ FALCONER NY 14733

Phone: 1-716-665-1132 ♦ Fax: 1-716-665-1135 ♦ World Wide Web: www.zurn.com

In Canada: ZURN INDUSTRIES LIMITED ♦ 3544 Nashua Drive ♦ Mississauga, Ontario L4V1L2 ♦ Phone: 905/405-8272 Fax: 905/405-1292

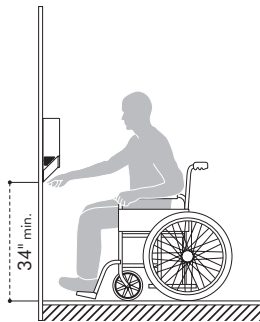
Mobility access within washroom facilities

Because the Airblade V hand dryer is primarily installed in a restroom setting, it must comply with at least two primary accessibility requirements. The first is that the unit be placed on an accessible route but not protrude into any required accessible clear area of other items, such as a door, sink, toilet, urinal or fixed waste receptacle. The second is the mounting height relating to reach range and space requirements to use the unit itself. State or local codes may require more stringent accessibility standards when facilities are newly constructed or altered. An accessible restroom is comprised of an accessible entrance, accessible turning space, and at least one type of accessible dispenser and fixture of each type. The Airblade V hand dryer would be considered a wall mounted unit similar to a towel dispenser. A base height of 34" AFF would provide a more usable height for children and adults and still would be in the compliant range of accessible use.



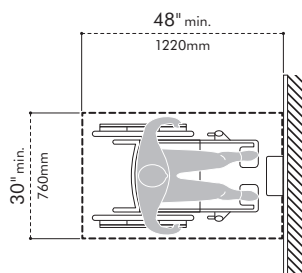
Clearance for wall-mounted protruding objects:

Airblade V is less than 4 inches protruding from the wall. Traditional hand dryers that protrude beyond the 4" are allowed to be of an unlimited distance by ADAAG as long as they are mounted at 27" above finished floor (AFF) or lower so that they overlap the cane detection range. Objects mounted with their leading edges at or below 27" (685 mm) AFF may protrude any amount; however, protruding objects should not reduce the clear width of an accessible route or maneuvering space. Any retrofit installation must comply with the newest and most stringent code standards.



Forward reach:

Often accessibility code concepts are concerned with people in a seated position who use wheelchairs, which naturally limits the height and depth of their reach range. Because of the design of the Airblade V hand dryer, the front approach is the only way the unit can be properly used, therefore the side approach standards should not apply.



Clear floor ground space:

A clear area in front of the unit should be a minimum of 30" wide by 48" of length. This area can overlap a circulation path but should not overlap other required accessible areas, for example, a lavatory sink in restrooms with access to more than one user at one time. Single use restrooms can overlap accessible areas due to the fact that they are used by only one person at a time.

Dyson Airblade V accessible installation matrix:	Yes/No	Compliant
Does the unit have the required front approach 30" x 48" clear floor clearance?	Yes	Yes
Does the reach range exceed 40" maximum height above the finished floor surface?	No	Yes
Is the hand dryer mounted at a height where it is considered a protruding object?	No	Yes
Does the front edge project more than 4" into the path of travel when properly mounted?	No	Yes
Does the unit provide the proper 9" toe clearance?	Yes	Yes

Conclusion

Based on the review of the Airblade V hand dryer, it appears that if properly installed at the recommended height of 34" above the finished floor, and the design professional allows the proper front approach clear area with no conflicting overlapping accessible areas, then the unit should comply with accessible requirements. Dyson Airblade V is less than 4" protruding from the wall, so there is no recessing necessary.

LOW VOLTAGE AND HIGH VOLTAGE TECHNICAL SPECIFICATION

Electrical

Input voltage: Low Voltage = 110-127 V, High Voltage = 208 V

Frequency: Low Voltage = 50 or 60 Hz, subject to voltage (85-115 V at 50 Hz; 85-130 V at 60 Hz); High Voltage = 50 & 60 Hz

Rated power: 1400 W

Motor type: Dyson digital motor – V4 brushless DC Motor

Motor switching rate: 6,100 per second

Motor speed: 92,000 rpm

Amp: Recommended dedicated 15 amp circuit,
Low voltage = 11.7 amps at 120V, High voltage = 7.3 amps

Operating temperature range: 32°– 104°F

Heater type: None

Standby power consumption: Less than 0.5 W

Construction

Casing construction: Polycarbonate ABS casing

Antimicrobial coating type: AB12 (Sprayed Nickel) Antimicrobial additive in paint. AB12 (White) Antimicrobial molded additive

Color finish: AB12 Sprayed Nickel molded plastic or AB12 White molded plastic.

Back plate/mounting bracket construction: ABS/PBT Plastic

Exterior screw type: Anti-tamper M4 Pin-Hex

Water ingress protection to IP24

Filter

Double-life HEPA filter (glass fiber and fleece prelayer)

Bacteria removal 99.97% at 0.3 microns

Operation

Touch-free proximity capacitive sensor.

Hand dry time measurement: 12 seconds*

Operation lock-out period: 30 seconds

Airspeed at apertures: 420 mph

Maximum Altitude: 2,000m/6,561 ft.

Operating airflow: Up to 7.39 gal/sec and up to 59.3 CFM

Rated operating noise power: 85 db(A)

Logistics

Net weight: 6.17 lbs.

Packaged weight: 8.81 lbs.

Packaged dimensions: (H) 5³/₄" × (W) 17⁷/₈" × (D) 10³/₄"

Unit barcodes:

Sprayed Nickel – Low Voltage: 885609001463, High Voltage: 885609004327;

White – Low Voltage: 885609001470, High Voltage: 885609004310

Standard warranty

5 year parts and 5 year limited labor warranty

Accreditations

Carbon Trust

NSF International

ADA compliant

Contributes to LEED certification



Product range (Select one)

AB12 Sprayed Nickel

Part number/SKU

- Low Voltage: 301829-01
- High Voltage: 301827-01



AB12 White

Part number/SKU

- Low Voltage: 301828-01
- High Voltage: 301825-01



The Carbon Reduction Label is the registered trade mark of the Carbon Trust.
The NSF logo is the registered trade mark of NSF International.

*Dry time measured using Dyson test method 769 based on NSF P335 using a measurement of 0.1g residual moisture.

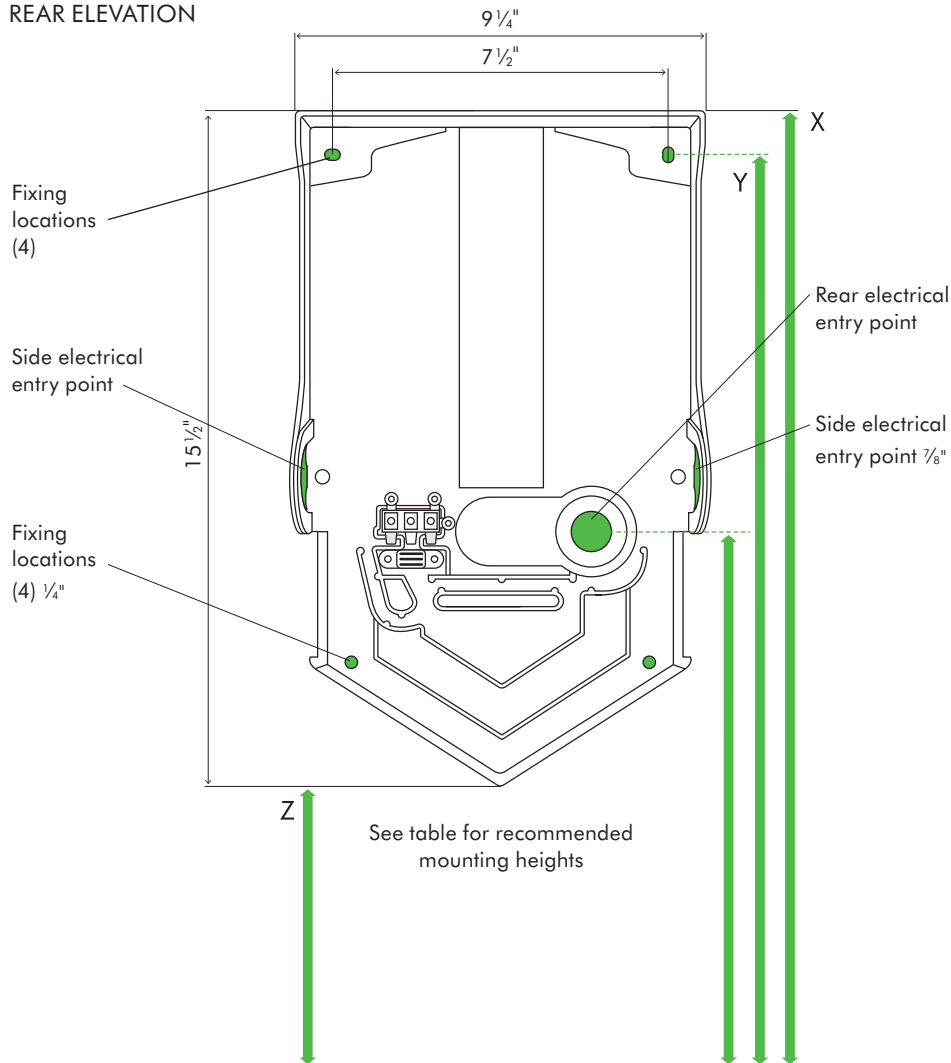
dyson airblade V



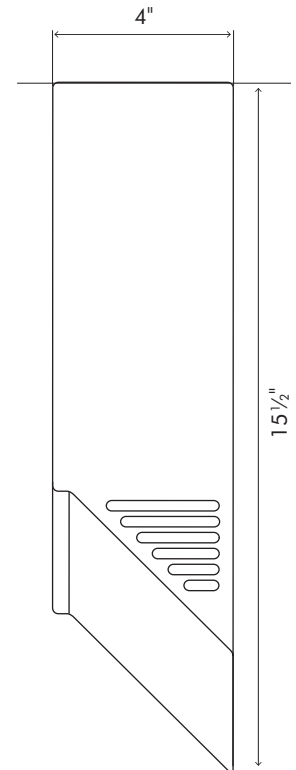
TECHNICAL SPECIFICATION

**AB
12**

REAR ELEVATION



SIDE ELEVATION



All dimensions shown in inches (+/- 3/16 inches)



Recommended installation heights from floor				Minimum clearance	
Male	X 52 1/8"	Y 51 3/16"	Z 36 5/8"	8 1/16" in clearance either side and 1 3/16" in above machine.	
Female	X 50 3/4"	Y 49 13/16"	Z 35 1/4"	Cable entry point from floor	
Child or disabled	X 42 5/16"	Y 41 3/8"	Z 26 13/16"	Male	42 7/8"
Child 5-8	X 37 1/2"	Y 36 7/16"	Z 22"	Female	41 1/2"
Child 8-11	X 41 7/16"	Y 40 1/2"	Z 25 15/16"	Child or disabled	33 3/16"
Machine dimensions				Child 5-8	28 1/4"
Height 15 1/2" Width 9 7/32" Depth 4"				Child 8-11	32 3/16"

For more information, please contact Dyson: 1-888-397-6622, www.dysonairblade.com, airbladeinfo@dyson.com

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- [SPECIALTY DOOR - CUSTOM](#)



STANDARD DOOR - CP1	
DOOR SIZE	88" x 142" (Consult factory for larger sizes)
CERTIFICATION	ATMOSPHERIC PATENTED DOOR
FIRE RATING	N/A
FRAME STYLES**	1, 2, 4 (w/ 4" HDR), 4.4 (w/ 4" HDR), 11 (w/ 4" HDR)
FRAME WIDTH	3-1/2" TO 5-3/4" (1,2), 5-3/4" (4), 4" (4.4), up to 9" (11)
HARDWARE*	*FACTORY INSTALLED, CERTIFIED CRAFTSMEN
WINDOW SIZE	MANY SIZES OR OPTIONS AVAILABLE
WARRANTY	LIFETIME GUARANTEE AGAINST CORROSION
QUALIFICATIONS	QUALIFYING STANDARD
DOOR SKIN BY ITSELF	ASTM E 1886 /1996 MISSILE IMPACT
FORCED ENTRY TEST	SFBC 3603.2
HEAT TRANSFER	ASTM C-518
SURFACE BURNING	ASTM E-84
ARC LIGHT EXPOSURE	ASTME G 155
SMOKE DENSITY	ASTM D-2843
SOUND TRANSMISSION	ASTM E-90
CYCLE PERFORMANCE	AAMA 920-3
FASTENER PROPERTIES	ASTM D-1761
THERMAL PROPERTIES	ASTM C-177

Chem-Pruf fiberglass doors systems are engineered and manufactured to withstand the most corrosive environments from saltwater, chemicals, detergents, chlorine, acid, to humidity and more. Every fiberglass door is custom manufactured to your exact requirements. Plus, with Chem-Pruf's Total Opening Solution, installation is a snap, the FRP doors ship pre-assembled in individual crates ready to be hung.

Gelcoat - Superior 25 mil molded gelcoat door finish is equal to 50 – 60 coats of paint, provides an impenetrable barrier against corrosive chemical and environmental attack, never needs to be painted, will never rust and is integrally molded into every fiberglass door product.

Plates - Measuring 0.125 inch thick and weighing 1.0 lb/ft², Chem-Pruf door plates are by far the strongest in the industry. The plates are hand laid and integrally molded in one continuous piece using high quality resins tailored to the specific environment. Not only are these plates impervious to corrosive attack, they provide outstanding protection against impact caused by high wind debris.

Stile and Rail – The plates and core bond to a one-piece cast in-place stile and rail system, forming a continuous seamless solid edge with no mitered corners, so no dirt, bacteria or moisture..

Core - The interior cavity of the FRP door is completely filled with a corrosion-resistant material. The type of core that is used, such as Polypropylene, Polyurethane Foam, Balsa or Mineral, is determined either by application or specification.

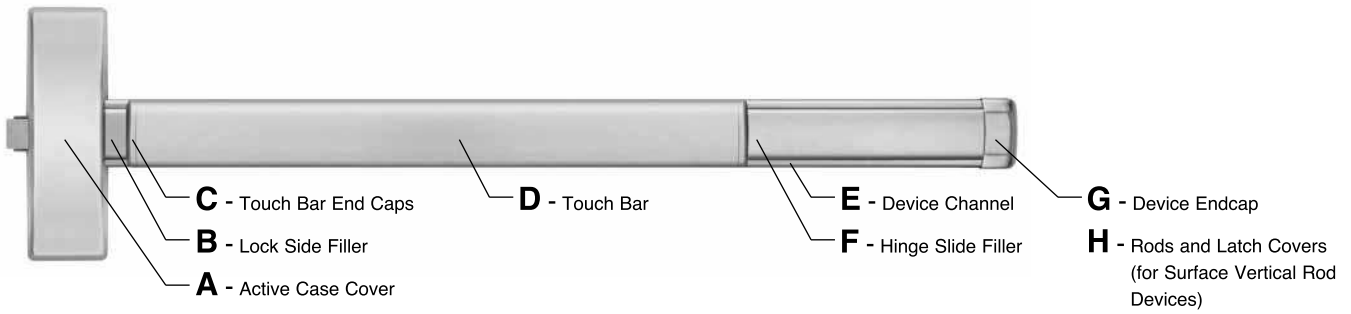
Bonding - Chem-Pruf has developed a proprietary bonding resin system to fuse the plates to the collar and core, creating one homogeneous, engineered structure that ensures the strongest interface possible. In this manner, there will be no separation or delamination – GUARANTEED.

Optional Window - Many window options are available including our patented pharmaceutical window that is completely sealed with no mechanical fasteners or ledges to harbor bacteria or standing water. Plus the window and window retainer match the FRP door in color and finish.

Optional Accessories - Chem-Pruf fiber reinforced door accessories are designed and manufactured to complement all Chem-Pruf FRP doors and frames. FRP thresholds, astragals, and sweeps are also available in matching colors to complete protection against corrosive environments.

Optional Hardware – The world's finest, corrosion resistant fiberglass door system would not be complete without high quality stainless steel hardware. Chem-Pruf maintains an inventory of top quality hardware from the country's leading manufacturers. Our highly skilled and trained personnel can install the hardware of your choice for a turnkey door system that is ready to be hung

at the jobs



Base Materials

Finishes	ANSI/BHMA	US	Aluminum	Brass	Bronze	Stainless Steel
Polished Brass, Clear Coated	605	US3	—	A,B,C,D,E,F,G,H	—	—
Satin Brass, Clear Coated	606	US4	—	A,B,C,D,E,F,G,H	—	—
Satin Bronze, Clear Coated	612	US10	—	—	A,B,C,D,E,F,G,H	—
Dark Oxidized Satin Bronze	613	US10B	—	—	A,B,C,D,E,F,G,H	—
Satin Aluminum, Clear Anodized	628	US28	A,E,F	—	—	B,C,D,G,H
Satin Chrome, Weatherized	626W	US26D	—	A,B,C,D,E,F,G,H	—	—
Satin Stainless Steel	630	US32D	—	—	—	A,B,C,D,E,F,G,H

Finishes

ANSI/BHMA	US	Description
605	US3	Polished Brass, Clear Coated
606	US4	Satin Brass, Clear Coated
612	US10	Satin Bronze, Clear Coated
613	US10B	Dark Oxidized Satin Bronze
625	US26	Polished Chromium Plated
626W	US26D	Satin Chrome, Weatherized
628	US28	Satin Aluminum, Clear Anodized
630	US32D	Satin Stainless Steel

Mullion finishes

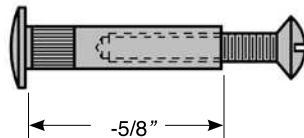
600	USP	Primed for Paint
689		Aluminum Paint
695		Dark Bronze Paint

Fasteners

Furnished standard with machine screws and full thread wood/sheet metal screws. Specify Sex Nuts and Bolts (SNB) where recommended or required by the door manufacturer.

Sex Nuts & Bolts (not furnished std.)

Sex Nuts & Bolts are furnished with No. 10-24 x 1" OHMS (1-1/2" long screws required for guides).



Security Screws

All exposed screws will be a Torx pin in tamper resistant type, machine screws only. Specify (SEC) Security Screws. Cover Screws use a T20 driver, End Cap Screws use a T25 driver.



Door Sizes

Stock sizes for door widths and heights are listed below. If required, cut to size in the field.

Door Widths **Stock Sizes**

2'-0" to 2'-6"	2'-6"*
2'-7" to 3'-0"	3'-0"
3'-1" to 4'-0"	4'-0"

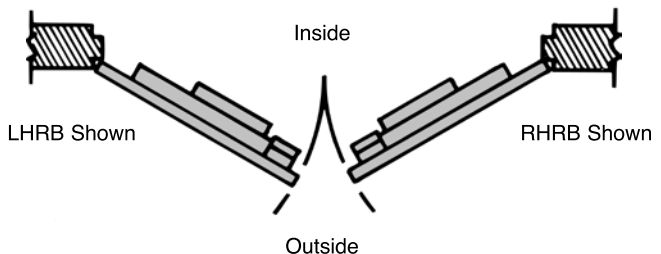
* Not available for Narrow Stile Devices.

Vertical Rod Devices

Device	Door Heights	Stock Sizes
Surface Vertical Rod Device*	up to 7'-0"	7'-0"
	7'-1" to 8'-0"	8'-0"
	8'-1" to 10'-0"	10'-0"
Concealed Vertical Rod Device	6'-8" to 8'-0"	8'-0"
	8'-1" to 10'-0"	10'-0"

* Surface Vertical Rods are furnished of the same material as the device. Stainless steel rods are furnished for 625, 628 and 630 devices.

Hand of Doors



RIM EXIT DEVICES



Apex 2100 Series - Reversible
Apex FL2100 Fire Exit Series - Reversible

DOORS - For all types of single and double doors with a mullion. For mullions, see page 18. Available for 1-3/4" to 2-1/4" thick, up to 4'-0" wide opening. For thicker doors, consult factory. Furnished standard for 1-3/4" thick, 3'-0" wide opening.

DEVICE - Covers ANSI A115.2 (Type 161), A115.18 cylinder lock and A115.1 (Type 86) Mortise Lock preparation.

FUNCTIONS - Functions are field selectable except for the Double Cylinder option. The device is furnished for a desired function if specified. If not specified the "03" function is furnished standard.

DOUBLE CYLINDER - Handed, "10" Function available. Requires two rim type cylinders, not furnished standard. See page 5 and 19.

BASE MATERIAL - The Cover, Touchbar, Device Channel, Lock/Hinge Side Filler and End Cap are furnished of heavy wrought Brass, Bronze or Stainless Steel. 628 Devices are furnished with Aluminum, Brass, Bronze and Stainless Steel components. See "Finish & Base Material" chart page 3.

CHASSIS - Investment Cast Steel, Zinc Dichromated.

LATCHBOLT - Stainless Steel, Deadlocking, 3/4" throw.

STRIKES - No. S300, Investment Cast Stainless Steel, Black Powder Coated furnished standard. No. S988, optional strike for use on Aluminum Door applications, please specify when ordering. No. S458, optional strike for use on Mullion applications, please specify when ordering. For optional strike information see page 34.

DOGGING - 1/4" turn hex key dogging standard. NOT available on Fire Exit Hardware.

TOUCHBAR HEIGHT - 39-15/16" from floor standard. May be varied as situation dictates.

REVERSIBLE - Reversible for all functions and Trims. Standard packaging RHRB.

UL LISTED - Panic and Fire Exit Hardware. For FIRE EXIT HARDWARE Ratings see page 33. Conforms to UL10C and UBC 7-2.

ANSI/BHMA - Devices are BHMA certified for ANSI 156.3, Grade 1.

FINISHES - 605, 606, 612, 613, 625, 626W, 628, 630. For Finish description see page 3.

CYLINDERS - Rim Type, not furnished standard. Specify when required. For cylinder details see page 19.

STILE WIDTH - See Stile Information on page 36.

RETOFIT APPLICATIONS - The 2100 and FL2100 Series Devices are designed to retrofit into other manufacturers' mounting hole locations. 1700 Series Pull Trim and 4900 Series Lever Trim may also be factory set for these applications by specifying prefix "R" (e.g. 2108 R4908A). Consult factory for details.

Apex 21 Series - Nonhanded

The 21 Series Device is designed to be compatible with many manufacturers' Access Control exterior trim. The device incorporates a center driven cam to receive the tailpiece of the access control product. The tailpiece rotation required to retract the latch is a minimum of 50 degrees. Consult factory for details.

DEVICE OPTIONS

Pre	Description	Page
C	Quick Connect Plugs.....	39
D	Delayed Egress.....	24
E	Electric Device	28
E	Electric Latch Retraction	21
F	Fire Exit Hardware	4
H	Windstorm and Hurricane Code Device	20
L	Latchbolt Monitoring Double Switch	29
L	Latchbolt Monitoring Switch	29
M	Motorized Latch Retraction	40-41
Q	Wireless Access Management System.....	30-32
T	Touchbar Monitoring Double Switch	29
T	Touchbar Monitoring Switch.....	29
W	Weatherized Touchbar Mon. Dbl. Switch.....	29
W	Weatherized Touchbar Monitoring Switch	29

To specify add Prefix to Device No. (e.g. TS2103)

Suf	Description	Page
A	Exit Alarm: battery operated	27
A	Exit Alarm: remote power	27
B	Braille Touchbar	35
C	Cylinder Dogging	19
D	Door Position Monitoring Switch.....	29
L	Less Dogging	19
S	Security Screws	3
S	Sex Nut and Bolt.....	3
W	Weatherized Exit Alarm: remote power	27

To specify add Suffix to Device No. (e.g. 2103CD)

1700A
"A" Grip



1700B
"B" Grip



1700C
"C" Grip



2000C
"C" Grip



1. All Trims are furnished with wrought plates and extruded or cast solid grips.
2. Specify Grip Design (A,B,C) ("A" Grip furnished standard for 1700 Series Trim, "C" Grip furnished standard for 2000 Series Trim)
3. 630 Trim is furnished for 628 Devices.
4. 626 Trim is furnished for 626W Devices.

Retrofit Applications

The R1700 Series Trim is designed to retrofit into other manufacturers' installations when used with the wide stile Apex Series Devices.

Consult factory for details.

4900A
"A" Lever



4900
"B" Lever



4900C
"C" Lever



4900D
"D" Lever



4900K
"K" Knob



V4908A
Vandal Resistant Trim

A heavy duty lever trim designed to withstand abuse and vandalism. Composed of extra strength shock-absorbing "overload" springs and heavy duty investment cast stainless steel internal components. Lever returns to the "home" position eliminating the need to reset the lever.

Retrofit Applications

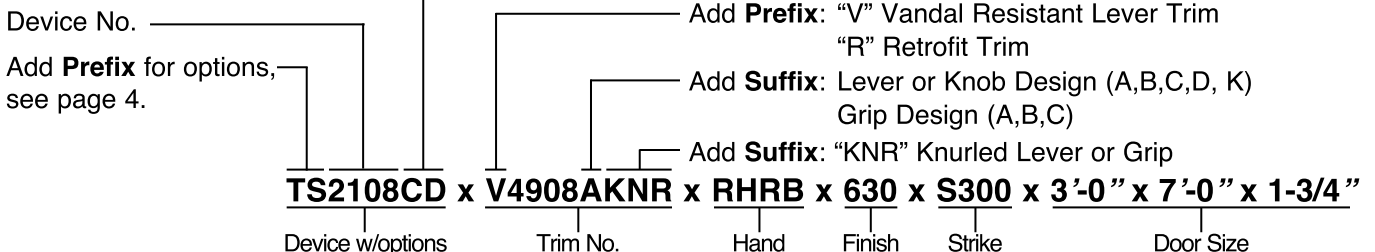
The R4900 Series Trim is designed to retrofit into other manufacturers' installations when used with the wide stile Apex Series Devices.

Consult factory for details.

1. All the escutcheons and levers are castings or forgings.
2. Specify Lever or Knob Design (A,B,C,D,K) and Handing ("A" Lever x RHRB furnished standard)
3. 626 Trim furnished for 626W, 628 and 630 Devices.
 - For Trim dimensions see page 38.
 - Trims are BHMA certified for ANSI 156.3, Grade 1.
 - Trims are through bolted and will cover 161 and 86 cutouts (except for 2000C Trim).
 - Cylinder, Rim Type, not furnished standard. For cylinder details see page 19.

ANSI Function	01	02	03	05	08	10*	14	15
	Exit Only (cover plate)	Dummy Trim	Key Retracts Latchbolt	Key Locks/Unlocks Thumbpiece	Key Locks/Unlocks Lever/Knob	Double Cylinder Inside Key Locks/Unlocks Lever/Knob	No Cylinder Lever/Knob Always Active	No Cylinder Thumbpiece Always Active
Device Nos.	2101 FL2101	2102	2103** FL2103**	2105 FL2105	2108 FL2108	2110 FL2110	2114 FL2114	2115 FL2115
Trim Nos.	1701 R1701	1702A R1702A	1703A R1703A	1705A R1705A	4908A V4908A	4908A V4908A	4914A R4914A	1715A R1715A
	2001	2002C	2003C	2005C	R4908A	R4908A		2015C
	4901	4902A	4903A		RV4908A	RV4908A		
	R4901	R4902A	R4903A					

Device with Trim:



Device Only: Device no., hand, finish, strike, and door size including thickness:
(e.g. TS2108CD x RHRB x 630 x S300 x 3'-0" x 7'-0" x 1-3/4")

Trim Only: Trim no., hand, finish, strike, and door size including thickness: (e.g. V4908A x RHRB x 626 x 1-3/4")

* "10" Function is handed

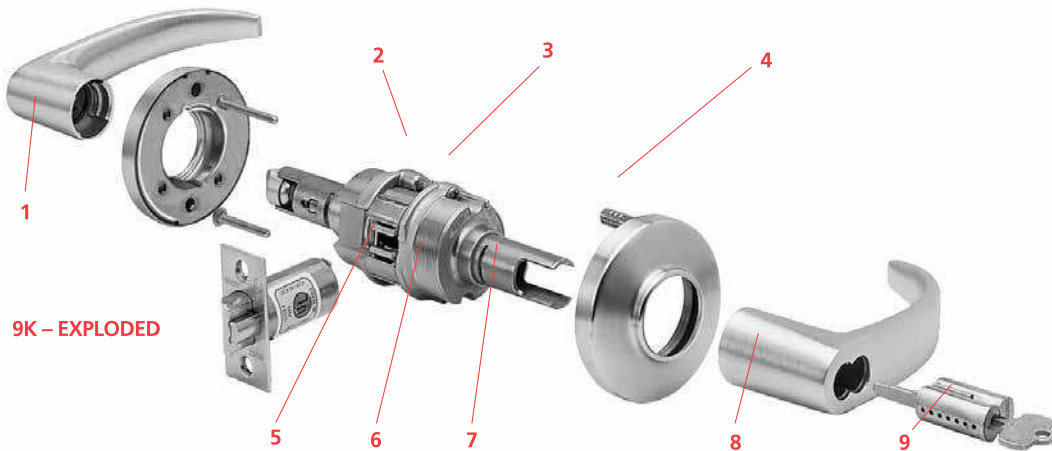
** 2103 & FL2103 x Cylinder Only Application includes Cylinder Attachment Kit "CA-03"

TABLE OF CONTENTS

Features	2	Deadlocking Latches & Strikes	10
Specifications	2-3	Lever Features & Dimensions	5
How to Order	3	Function	6-9
Shipping Weights	4	Strike & Door Preparation	11
Lever Styles & Trim	4	9K Sample Specifications	11
CORMAX™ Patented Keying System	10	Service Equipment	12

Feature

1. For versatile applications, lever by knob trim variations are available.
2. Rose locking pin and rose assembly design offers great torque resistance. It prevents the locking pin from twisting, bending, or breaking under attack.
3. The innovative design of the slotted key release cam and locking lug assembly create maximum attack resistance. Even though damaged, the lock still allows key access. In addition, the lever is fully functional from the inside. The hub-mounted torsion spring and strong retractor springs help prevent lever sag and offer a smooth and snappy operation.
4. Strong through-bolt mounting studs increase torque resistance. Heavy rose liner material is highly attack resistant.
5. Strong retractor springs provide resistance to lever sag.
6. Zinc hubs with a shrouded locking lug, guaranteeing higher quality and increased torque resistance.
7. The outside lever sleeve is a seamless one piece construction made of a hardened steel alloy that provides additional reinforcement in the locking lug slot.
8. Lost Motion feature available allowing 45° lever rotation in either direction without engaging retractor assembly.
9. Interchangeable core allows for quick re-keying and customized masterkeying.



Specifications

ADA–Americans With Disabilities Act: 9K series – The design and operation of the BEST® cylindrical lock meets the intent of the standard for ANSI A117.1 section 404.2.6

Builders Hardware Manufacturers Association: 9K series – Listed by BHMA for A156.2, Series 4000, Grade 1.

Underwriters Laboratories®: 9K series – Listed by Underwriters Laboratories for use on 3 Hr, A label for single or double swinging doors.

Florida Building Code and Miami-Dade County Code: 9K series – 9/16” latch throw – Listed by Florida Building Code and Miami-Dade County at ± 75 PSF for single doors. 9K series – 3/4” latch throw – Listed by Florida Building Code and Miami Dade County at ± 80 PSF for single doors and ± 50 PSF for double doors.

“WS” option must be ordered for the lock to include a “Miami-Dade County Product Control Approved” label for inspection purposes.

California State Fire Marshal: 9K series – Listed with California State Fire Marshal.

9K series 14 & 15 lever conforms with California Title 24.





Backset – 2 3/4" standard, 3 3/4" and 5" available.

Chassis – Critical latch and chassis components are brass or corrosion-treated steel. 2 1/16" diameter to fit 2 1/8" hole in door (Conforms to ANSI A115.2). Lost Motion feature available as an option. (see page 5 for options/features).

Door thickness – Available for 1 3/4" to 2 1/4" doors only. Spacers available for 1 3/8" doors.

Roses – C – 3" Convex, D – 3 1/2" Convex, K – 3" Convex-no ring, L – 3 1/2" Convex-no ring

Products protected by one or more of the following patents – 5,590,555 5,794,472 Other products patent pending.

Finishes –

(BHMA)	US	DESCRIPTION	(BHMA)	US	DESCRIPTION	(BHMA)	US	DESCRIPTION
605	3	bright brass	613	10B	oxidized satin bronze,	622	19	flat black
606	4	satin brass			oil rubbed	625	26	bright chromium plated
611	9	bright bronze	618	14	bright nickel plated	626	26D	satin chromium plated
612	10	satin bronze	619	15	satin nickel plated	690	20	dark bronze

Antimicrobial Finish – 626AM satin chrome plated with UltraShield™ antimicrobial protected coating

The BEST UltraShield™ finish inhibits the growth of bacteria and other microbes on the surface of the hardware.



NOTE: BEST's UltraShield™ option is recommended for use on any hardware application where product cleanliness is a high priority. i.e.: Hospital/Healthcare, Elderly Care, Education, Transportation, Food-Service, Hospitality.

Latch – Solid brass 9/16" throw. Front 2 1/4" x 1 1/8" beveled.

Lever handles – Lever handles are a high-quality zinc alloy. Trim components are brass or bronze. Body is approximately 5/8" in diameter; Handle is approximately 4 3/4" long (from center-line of chassis). #14 and #15 levers conform to California Administrative Code Title 19 and Title 24. All three styles of levers conform to the Illinois Accessibility Standard.

Mounting – In addition to standard door preparation (ANSI A115.2 for 1 3/4" doors), two additional holes are needed for through-bolts. Through-bolts require two 5/16" diameter holes located at 12 o'clock and 6 o'clock positions. A drill jig can be ordered to insure accuracy of the holes. (see KD303 page 5).

Projection on door – Approx. 2 3/4" when mounted on 1 3/4" door.

Strike – STK: Conforms to ANSI A115.2 (2 3/4" x 1 1/8" with curved lip & box). S3: Conforms to ANSI A115.2 for 1 3/4" doors (4 7/8" x 1 1/4" with curved lip). S3-7/8: Conforms to ANSI A115.2 for 1 1/4" doors (4 7/8" x 1 7/8" flat)

How to Order

9K	3	7	AB	15	A	STK	626	
Series	Backset	Core Housing	Function Code	Lever	Rose Style	Strike Package	Standard Finishes	Options
9K	3 – 2 3/4" 4 – 3 3/4" 5 – 5"	0– keyless 7– 7-pin housing accepts all BEST® cores	AB– entrance D– storeroom L– privacy N– passage R– classroom etc.	♿14– curved return ♿15– contour angle return ♿16– curved no return	C– 3" convex D– 3 1/2" convex K– 3" convex - no ring L– 3 1/2" convex - no ring	STK– 2 3/4" ANSI S3– 4 7/8" ANSI S3– 7/8- 7/8" flat strike	605 606 611 612 613 618 619 622 625 626 690	AL– abrasive lever LL– lead lined LM– lost motion RQE– request to exit** SH– security head screws TL– tactile lever 3/4– 3/4" throw latch 7/8" LTC– flat lip strike NOTE: specify inside (I), outside (O), or both (B) for AL,TL options
			pages 6-9	pages 4-5	pages 4-5	page 11		page 5

*Handles are made from a zinc alloy, and have been plated to be equivalent in appearance to the finishes listed.

For information on 9K non-IC products please refer to BEST's non-IC keying products brochure.

**RQE option requires modification to chassis and is sold with assembly unit only.

Shipping Weight

The chart is the approximate shipping weight for the standard 9K functions locksets. This weight includes the weight of the lockset with the "#15" style lever, "K" style rose, latch, strike package, and box. Listed separately are the approximate weights for "with core" and "less core" shipments.

Lock Function Nomenclature	Case Quantity	Shipping Weight With Core	Shipping Weight Less Core
Y	9		31 lbs
N	9		40 lbs.
L,NX,P	9		40 lbs.
AB,D,E,H,HJ,R,T	9	42 lbs.	40 lbs.
C,G,IN,S,W	9	44 lbs.	40 lbs.

Lever Styles and Trim

#14C 



#15C 



#16C 



#14D 



#15D 



#16D 



#14K 



#15K 



#16K 



#14L 



#15L 



#16L 



Lever Features

Abrasive Lever Option

Besides complying with a wide variety of accessibility codes and ordinances, BEST lever handles are available with a special abrasive feature. Abrasive strip on the lever immediately identifies warnings on doors to hazardous areas for the blind.

To order: Designate **"AL"** on How to Order (page 3). Note: abrasive strip is available on all levers, except #14, #15, #16 levers in 613 finish.

Lost Motion Feature

The Lost Motion feature allows the lever handle to move 45 degrees from parallel to the horizontal plane without engaging the latchbolt assembly. When the lockset is in the locked mode, this feature makes over-torque or over-lever-age abuse more difficult to achieve. **To order:** designate **"LM"** on How to Order (page 3).

Non IC Lever Option

The 9K heavy duty cylindrical lock may be adapted to existing keying systems by using a special retrofit lever and throw member that will accept 6 pin single shear-line cylinders from non BEST manufacturers. No internal modifications are required to adapt the 9K to cylinders from the following manufacturers: Corbin-Russwin, Medeco, Sargent, Schlage, Yale. Refer to BEST® non-IC keying products brochure for more details.

RQE Feature

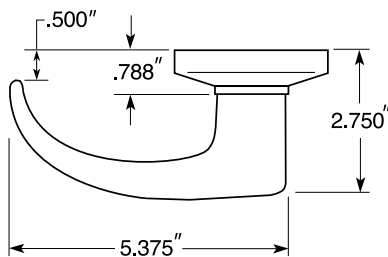
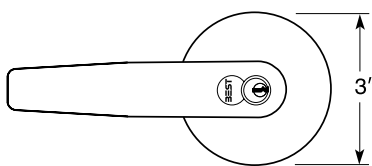
The 9K lever handle cylindrical can be built to incorporate a request-to-exit (RQE) switch. A normally open switch provides momentary switch closure when the inside lever is rotated. RQE option requires modification to chassis and is sold with assembly unit only.

To order: designate **"RQE"** on How to Order (page 3).

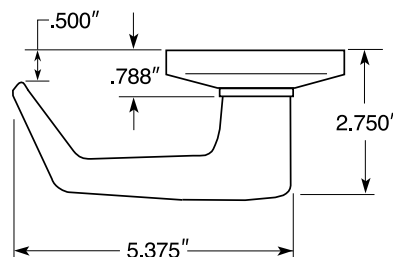
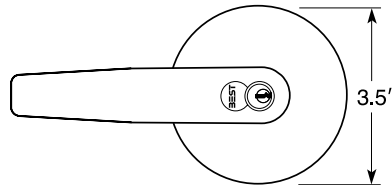
Tactile Lever Option

Tactile levers may be used in areas where improved grip is required or as a warning in hazardous areas. Grooves are machined into the back of the hand grasp portion of the lever to improve grip and/or to provide a sensory warning in hazardous areas. This option can be used for Blind, Safety or Accessibility applications. **To order:** Designate **"TL"** on How to Order (page 3).

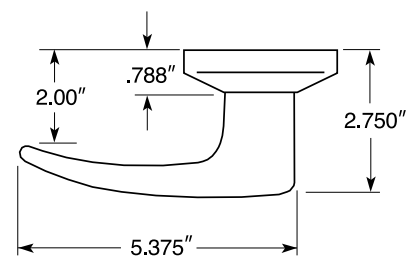
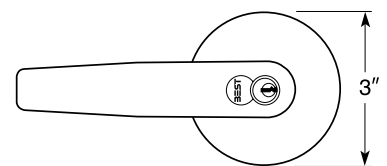
Lever Trim Dimension



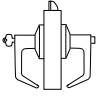
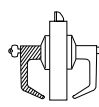
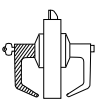
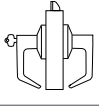
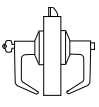
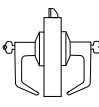
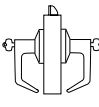
#14C or #14K Trim
("C" rose shown)



#15D or #15L Trim
("D" rose shown)



#16C or #16K Trim
("K" rose shown)

	Description	Outside Lever		Inside Lever	
Function & Diag. (ANSI No.)	Latch operated by	Locked by	Unlocked by	Locked by	Unlocked by
Single keyed					
Entrance (AB) F109 	<ul style="list-style-type: none"> Rotating the inside lever, Rotating the outside lever— only when the inside push button is out, Turning the key in the outside lever 	<ul style="list-style-type: none"> Pushing the inside button, Pushing and turning the inside button. Turning the button keeps the outside lever locked until the button is turned back 	<ul style="list-style-type: none"> Turning the key in the outside lever, (only when the button is not turned) Rotating the inside lever, (only when the button is not turned). Closing the door (only when the button is not turned) 	Cannot be locked	Always unlocked
Storeroom (D) F86 	<ul style="list-style-type: none"> Turning the key in the outside lever, Rotating the inside lever 	Always fixed	Cannot be unlocked	Cannot be locked	Always unlocked
Service Station (E) F92 	<ul style="list-style-type: none"> Rotating the inside lever, Rotating the outside lever—only when the inside push button is out. Turning the key in the outside lever 	<ul style="list-style-type: none"> Pushing the inside button, Pushing and turning the inside button. Turning the button keeps the outside lever locked until the button is turned back 	<ul style="list-style-type: none"> Turning the key in the outside lever, Rotating the inside lever, Closing the door—only when the button is not turned, Turning back the slotted button 	Cannot be locked	Always unlocked
Hotel Guest Room (H) F93  (Indicator Included)	<ul style="list-style-type: none"> Rotating the inside lever, Turning the key in the outside lever—only when the inside push button is out, Removing the core with a control key and using a special emergency key 	Always fixed	Key block feature is released by: <ul style="list-style-type: none"> Rotating the inside lever, Closing the door 	Cannot be locked	Always unlocked
Pushing the inside button projects an “occupied” indicator in the outside lever and blocks all operating keys.					
Hotel Guest Room (HJ)  (No Indicator)	<ul style="list-style-type: none"> Rotating the inside lever, Turning the key in the outside lever—only when the inside push button is out, Removing the core with a control key and using a special emergency key 	Always fixed	Key block feature is released by: <ul style="list-style-type: none"> Rotating the inside lever, Closing the door 	Cannot be locked	Always unlocked
Pushing the inside button blocks all operating keys, but no “occupied” indicator is projected.					
Classroom (R) F84 	<ul style="list-style-type: none"> Rotating the inside lever, Turning the key in the outside lever, Rotating the outside lever when not locked by key 	Turning the key in the outside lever,	Turning the key in the outside lever,	Cannot be locked	Always unlocked
Dormitory (T) F90 	<ul style="list-style-type: none"> Rotating the inside lever, Rotating the outside lever when not locked by key or push button 	<ul style="list-style-type: none"> Turning the key in the outside lever, Pushing the button on the inside lever 	<ul style="list-style-type: none"> Turning the key in the outside lever, Rotating the inside lever (only when locked by push button), Closing the door (only when locked by push button) 	Cannot be locked	Always unlocked
Double keyed*					
Corridor (C) F88 	<ul style="list-style-type: none"> Rotating the inside lever, Rotating the outside lever when not locked by key, Turning the key in the outside lever 	Turning the key in the inside lever	Turning the key in the inside lever	Cannot be locked	Always unlocked
Storeroom* (G) F91 	<ul style="list-style-type: none"> Rotating the outside lever when not locked by key, Rotating the inside lever when not locked by key 	<ul style="list-style-type: none"> Turning the key in the inside lever, Turning the key in the outside lever 	<ul style="list-style-type: none"> Turning the key in the inside lever, Turning the key in the outside lever 	<ul style="list-style-type: none"> Turning the key in the inside lever, Turning the key in the outside lever 	<ul style="list-style-type: none"> Turning the key in the inside lever, Turning the key in the outside lever
Turning the key in either the inside or the outside, locks or unlocks both sides.					

*ATTENTION: Locksets that secure both sides of the door are controlled by building codes and the Life Safety Code. In an emergency exit situation, failure to quickly unlock the inside lever could be hazardous or even fatal.

626W: Weatherized Finish



*Quality Materials.
Every Time.*

Preserve performance and aesthetics over the long term.

PRECISION's 626W finish protects exit devices and extends product life. Conforming to ANSI/BHMA guidelines, our 626W finish is a true architectural finish—chrome plating over brass for each exterior component—not just a color match. Because we don't compromise on materials, our 626W-protected exit devices resist rust, corrosion, and salt air over the full life of the product. Available on all APEX 2000 Series exit devices, PRECISION's 626W finish provides the ideal solution for applications like natatoriums, water treatment facilities, and exterior gates. For protection from environmental factors over the long term, choose the true 626 finish—PRECISION's 626W.



Strength by design. Simply PRECISION.

The premium finish for performance and durability on exterior doors.

Our 626W weatherized finish combines security with durability and long-lasting aesthetic appeal. PRECISION constructs all exterior components from brass and coats each one with 626W for a consistent look and performance. With greater durability than non-architectural finishes, 626W provides lower maintenance and longer product life—and the highest value for exterior applications.

PRECISION 626W Specifications	
Certifications	Meets ANSI/BHMA A156.18-2012 guidelines for true architectural finish MIL-STD-810G 510.6 Sand and Dust MIL-STD-810G 521.4 Icing/Freezing Rain MIL-STD-810G 509.6 Salt Fog
Specifications	Formulated to withstand environmental challenges All exterior components constructed from brass All exterior components plated with satin chrome
Availability	Exit Devices: Apex 2000 Series Exit Trims: 4900 Series; 1700 Series (A and C grips)
Warranties	Three-year finish warranty

626W Features and Benefits

- **True architectural finish.** PRECISION's 626W finish meets ANSI requirements for a true architectural finish—not just a color match, but chrome plated over brass components.
- **Premium weatherized option.** The premium 626W finish option provides a truly weatherized finish to protect exit devices in exterior applications from environmental conditions, rust, corrosion, and salt.
- **Consistent look.** All exterior components of PRECISION 626W weatherized exit device are constructed from brass and treated with 626W finish. This gives a consistent aesthetic to the device as well as ensuring long-lasting performance.
- **Greater durability.** Constructed of brass and plated with our premium 626W finish, PRECISION weatherized exit devices resist damage and maintain aesthetic appeal throughout the life of the product.
- **Higher value.** From reduced maintenance to longer product life, PRECISION exit devices, weatherized with our premium 626W finish, deliver the highest value for exterior applications.
- **Weatherized electrical options.** The 626W finish can be added to additional components, with options including weatherized touchbar monitoring switch (WTS), weatherized touchbar monitoring double switch (WTDS), and weatherized exit alarm (WALW).



All exterior components of a PRECISION 626W weatherized exit device are constructed from non-ferrous brass for durability and a consistent look once finish is applied.



Since each exterior-facing surface is made of brass and coated with 626W chrome plating, the entire device is weather-resistant.



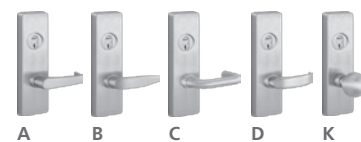
PRECISION's 626W is a true architectural finish. Unlike color matches used in other exit device brands, the PHI 626W finish stands up to rust, corrosion, and environmental conditions. A premium 626W weatherized exit device delivers uncompromised performance and aesthetics for the life of the product.

3R02301RHRB626W

For weatherized exit devices, choose PRECISION's 626W—the long-lasting quality, aesthetic, and security you need for exterior applications.

AVAILABLE EXIT TRIMS

4900 Series



1700 Series



FEATURES & BENEFITS

CONSTRUCTION

18 gauge Type 304 stainless Steel swirl design bowl, 14 gauge Type 304 Stainless Steel bracket, and a vandal-resistant bottom plate provides a long lasting unit with added peace of mind.

QUALITY CONTROL

Both fountains are pre-built and fully water and pressure tested to ensure proper functionality.

BACK PANEL

Stainless steel back panel helps to protect the wall from inadvertent splashing, and its decorative satin finish increases location visibility and completes the fountains attractive appearance.

MOUNTING

3/16" (.47 cm) steel mounting plate with supplied mounting hardware for a solid unit base allows for easy installation to a framed wall. (P-trap and stop require rear access)

BUBBLER HEAD

Polished chrome-plated brass bubbler head with integral laminar flow prevents splashing while providing a superior flow pattern. The integral basin shank and inserted roll pin add vandal resistance strength. Shielded, angled stream opening provides a steady, sanitary source of drinking water at .45 gpm.

PUSH BUTTON VALVE

The push-button activated valve assembly allows for front access stream adjustment as well as cartridge and strainer access. The valve works at an operating pressure range of 30 to 90 psi (2.1 to 6.2 bar).



SPECIFICATIONS

Model 1011 "Hi-Lo" wall mounted barrier-free drinking fountain shall include dual 18 gauge Type 304 Stainless Steel satin finish basins with integral swirl design, 14 gauge Type 304 Stainless Steel wall bracket, 100% lead-free waterways, push-button operated stainless steel valves with front-accessible cartridge and flow adjustment, polished chrome-plated brass vandal-resistant bubbler heads with integral laminar anti-squirt flow, chrome-plated brass vandal-resistant waste strainers, vandal-resistant bottom plates, stainless steel satin finish back panel, high and low fountain mounting levels, and 1-1/4" O.D. (3.2 cm) waste pipes. (P-trap and stop require rear access) REQUIRES MODEL 6700.4 PRICED SEPARATELY.

OPTIONS

- Fountain Skirt: Model SK3, satin finish stainless steel cane touch skirt for installation on high unit in some applications that may need to comply with ADA protruding objects guidelines.
- Water Filter: Model 6426, 10" x 2" (25.4 x 5.1 cm), in-line lead removal element that reduces lead from incoming water supply.
- Access Panel: Model 6603, satin finish stainless steel access panel. Includes frame and screws.
- Support Frame: Model 6800 universal in-wall mounting support for use with most fountains.

For more information, visit www.hawsco.com or call (888) 640-4297.

APPLICATIONS

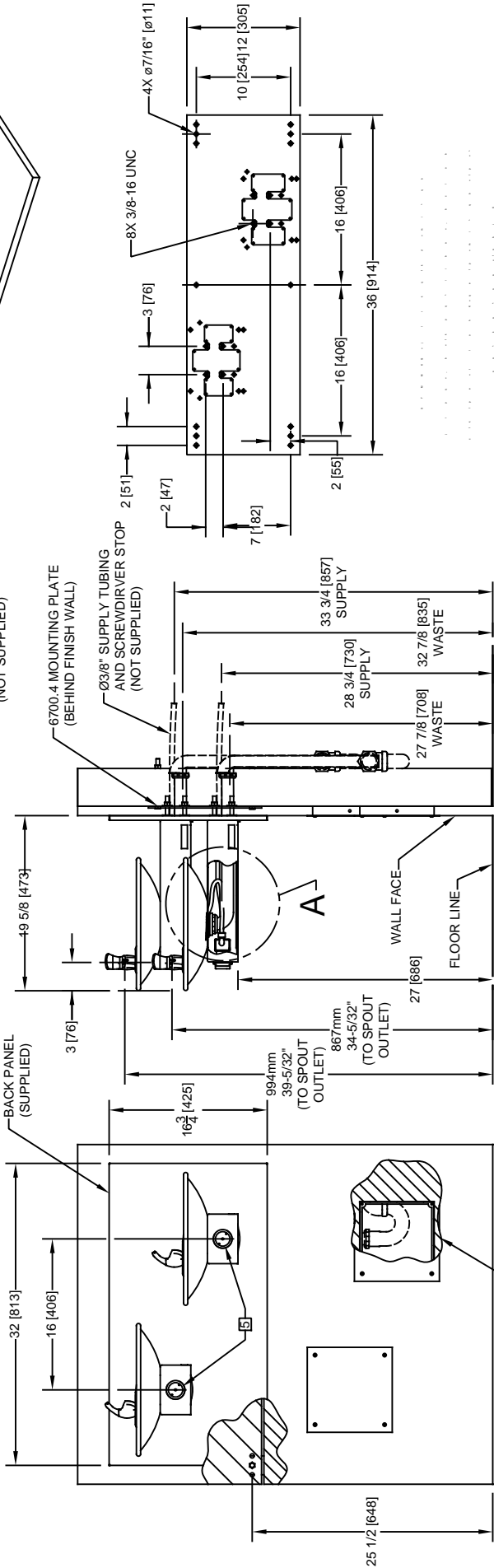
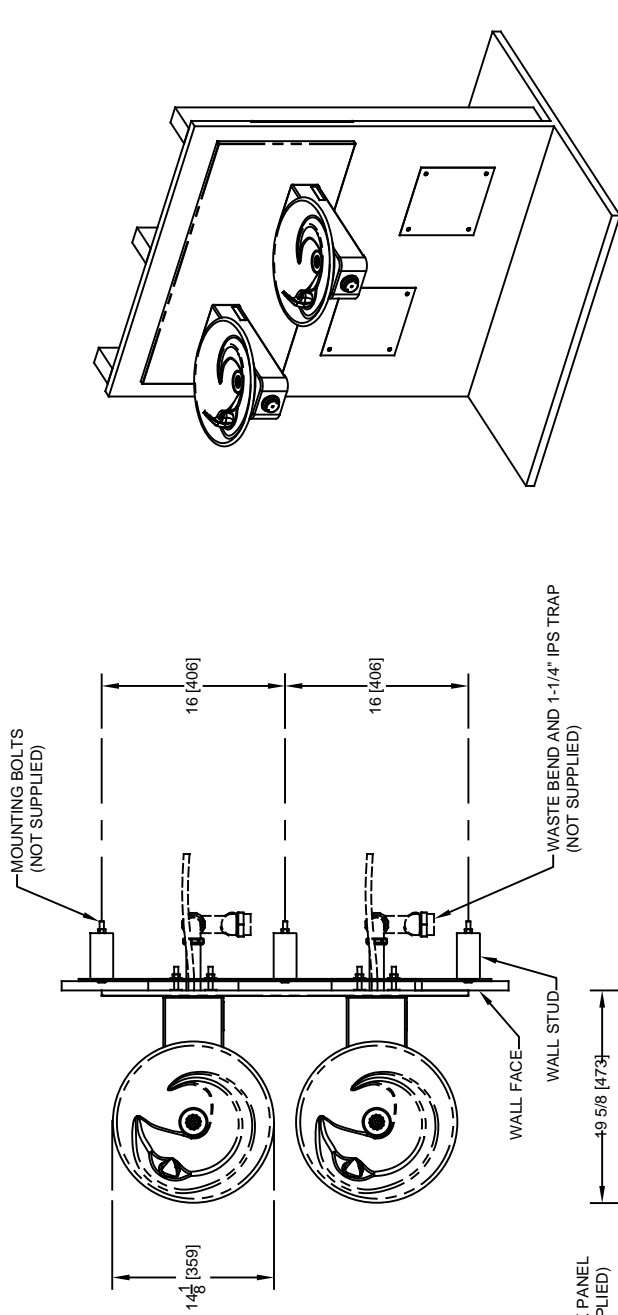
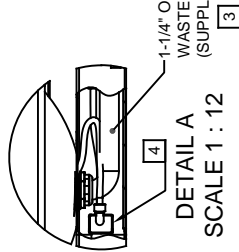
Perfect for either public or private indoor/outdoor settings, Model 1011 is a great fit in areas where aesthetics are important to the overall appeal of the architecture. This series is precisely mounted, making it a nice addition to any surrounding. Beautiful satin finish helps to maintain the fountains overall appeal so it always remains looking as new as it did when it was installed. Specifically, this type of wall mounted drinking fountain may be placed in settings such as: schools and other locations in and around office buildings where the temperature remains above freezing. Model meets all current Federal Regulations for the disabled including those in the Americans with Disabilities Act. Haws manufactures drinking fountains and electric water coolers to be lead-free by all known definitions including NSF/ANSI Standard 61, Section 9, NSF/ANSI 372, California Proposition 65, and the Federal Safe Drinking Water Act. Product is compliant to California Health and Safety Code 116875 (AB 1953-2006) as evaluated by CSA International.



THIS DOCUMENT IS TRUE AND CORRECT AT TIME OF PUBLICATION. CONTINUED PRODUCT IMPROVEMENTS MAKE SPECIFICATIONS AND MEASUREMENTS SUBJECT TO CHANGE WITHOUT NOTICE.

NOTES:

1. HOLD ROUGH-IN DIMENSIONS $\pm 1/8"$ (3.2mm).
2. WHEN INSTALLING THIS UNIT, LOCAL, STATE, OR FEDERAL CODES SHOULD BE ADHERED TO FOR INSTALLATION DIMENSIONS (LOCATIONS), WASTE AND SUPPLY REQUIREMENTS OTHER THAN SHOWN.
3. INSTALLER MUST PROVIDE TRAP FOR PROPER INSTALLATION.
4. REMOVE VALVE FROM PUSH BUTTON TO INSTALL WASTE ELBOW ONTO BOWL. AFTER WASTE ELBOW IS INSTALLED, REINSTALL VALVE AND ADJUST FLOW.
5. REFER TO 5874 SERIES OPERATION AND MAINTENANCE MANUAL FOR PUSH BUTTON AND VALVE INSTALLATION/MAINTENANCE INSTRUCTIONS.



1455 KLEPPE LANE
SPARKS, NEVADA 89431
(775) 359-4712 FAX (775) 359-7424
E-MAIL: HAWS@HAWS.CO.COM
WEBSITE: WWW.HAWS.CO.COM

EON NO. REVISED PER BY:	MODEL(S)	1011/1011HPS
ECN: 5124 LVC	DRINKING FOUNTAIN	
DRAWN: RM	SCALE: 1:1	INSTALLATION
DATE: 05/98	SIZE: A	SHEET 1 OF 1
APPROVED: FV		
DATE: 07/08/17		
PART NUMBER	0002076520.D	REVISION
		19

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roducts_(product).

Anti-Climb Fence_(/products/nti-Climb-Fence).

Temporary Fence_(/products/Temporary-Fence-new).

Fused Bonded_(/products/Fused-Bonded).

Extruded Bonded_(/products/Extruded-Bonded).

Galvanized_(/products/Galvanized).

Aluminized_(/products/Aluminized).

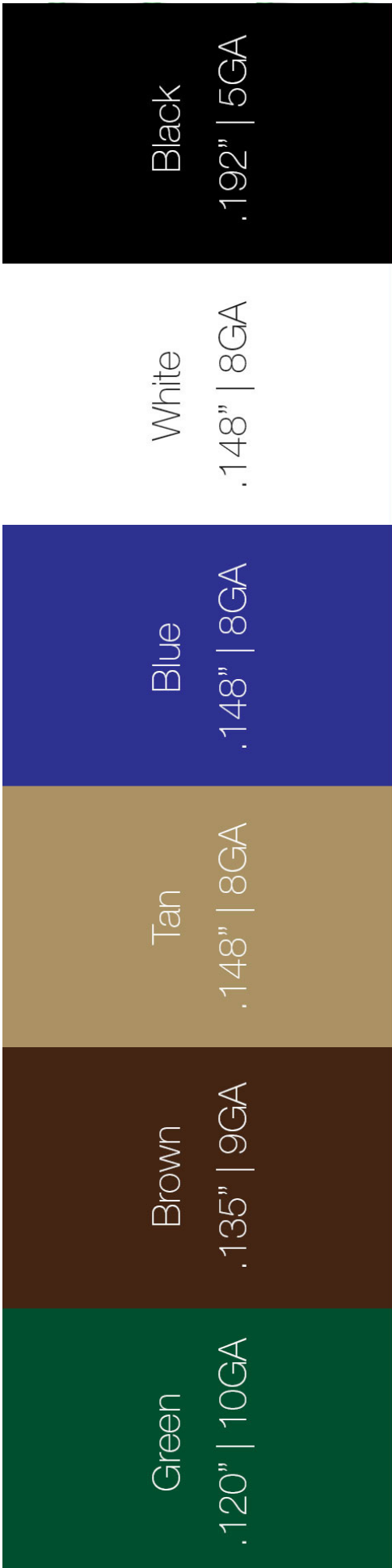
FUSED BONDED

What does “Fused Bonded” mean?

Fused bonding is the process where PVC, or polyvinyl chloride, is thermally fused to a core steel wire to not only protect it, but also to create an outer layer with color. In other words, the fused bonding process literally bakes the PVC onto the wire.

The PVC-coated wire is then woven into a chain link fence of various mesh sizes, heights, and colors. The PVC-coating on fused bonded wire is thinner than extruded bonded wire (the other type of PVC-coated wire), yet it is tougher and more resistant to peeling.

Swan Fence has the below six standard colors available, and we are also able to match any custom color to satisfy our customers.



SWAN FUSED BONDED STANDARD COLOR

FUSED BONDED FENCE STANDARDS AND SPECIFICATIONS

ASTM F-668 Class 2b
AASHTO M-181 Type IV Class B
RR-F-191 Type IV

Gauge	Mesh Size									
	2"	1-3/4"	1-1/2"	1-1/4"	1"	3/4"	5/8"	1/2"	3/8"	1/4"
12 CORE / 11 FINISH	0	0	0	0	0	0	0	0	0	0
11 CORE / 10 FINISH	0	0	0	0	0	0	0	0	0	scars on bends

Gauge	Mesh Size												
	0	0	0	0	0	0	0	0	0	0			
10 CORE / 9 FINISH	0	0	0	0	0	0	0	0	0	0	scars on bends	scars on bends	-
9 CORE / 8 FINISH	0	0	0	0	0	0	0	0	0	0	scars on bends	scars on bends	-
7 CORE / 6 FINISH	scars on bends	scars on bends	scars on bends	scars on bends	scars on bends	scars on bends	scars on bends	scars on bends	scars on bends	-	-	-	-
6 CORE / 5 FINISH	scars on bends	scars on bends	scars on bends	scars on bends	scars on bends	scars on bends	scars on bends	scars on bends	scars on bends	-	-	-	-

Swan Fence Inc.

Swan Fence takes great pride in providing quality material with quality service. Feel free to call us with any questions and quotes you might need. We hope to hear from you soon.



[_ \(http://www.chainlinkinfo.org\)](http://www.chainlinkinfo.org)



**American
Fence
Association**

[_ \(http://americanfenceassociation.com\)](http://americanfenceassociation.com)

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Address

600 W. Manville Street
Compton, CA 90220
☎ 800-688-7926 (SWAN)

✉ sales@swanfence.com [_ \(/contact\)](#)

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600 W. MANVILLE ST., COMPTON, CA 90220

11 GA CORE 10 GA FINISH FUSED BONDED
3/8" MINI-MESH

Bud Kearns Aquatic Center Improvements

ENVIROSEAL™

ES8 SERIES

PRODUCT FEATURES:

- » Surface mount – ceiling or wall;
8"×24", 8"×36", 8"×48", 8"×96"
- » Cold rolled steel or stainless steel housing for corrosion resistance
- » Continuous row mount for multiple luminaires
- » IP65 Option available



PROJECT INFORMATION

Job Name _____

Fixture Type _____

Catalog Number _____

Approved by _____

SPECIFICATIONS

HOUSING: One-piece, seam-welded 20-gauge CRS. Base provided with four-point mounting holes and one wireway hole. Lens is positioned in baseplate channels and retained with stainless steel fastener(s). Base mounts flush to ceiling or wall surface.

LENS/GASKET: UV-stabilized, pearlescent or clear polycarbonate. Smooth exterior, linear prismatic interior. Nominal thickness .125" (.32cm). IP65 option provided with linear silicone gasket to seal lens frame to housing.

FINISH: Brushed stainless steel finish (#4B) or white TGIC polyester powder coat – 5-stage pre-treatment; Salt spray test: 1,000 hours; Reflectance: 92%.

SOCKETS: Shock-resistant sockets with internal locking collar to ensure positive lamp retention.

HARDWARE: One Type 302 stainless steel Phillips head fastener secures lens in housing channel.

ELECTRICAL: **LED:** Available 3500K, 4000K and 5000K color temperatures, 82 CRI. 120-277VAC or 347VAC, 50/60Hz electrical input with serviceable high power factor electronic, constant-current driver (<20% THD, >0.95 PF). Standard 0-10V dimming with 10-100% range, maximum driver source of 500 µA. Optional embedded microwave motion sensor (MS) has factory default settings of 20 minute time out, dims down to 30%. **LE:** Class P ballast. Fluorescent electronic 120/277 or 347 voltage ballasts, high power factor. Optional one-lamp 90 minute nickel-cadmium battery pack (EL) includes inverter charger, test switch and charging indicator lamp.

PHOTOMETRICS: Photometry tested to the IESNA LM-79-08 standard by an ILAC/ISO17025 accredited laboratory. For additional photometric information, go to www.kenall.com.

WARRANTY: Four-point mounting, polycarbonate lens and Torx® with center pin fastener (1) required for Peace of Mind Guarantee®. One (1) year warranty against defects in materials and workmanship. Five (5) year warranty on LED lamps and driver for defects resulting in a fixture lumen depreciation of 30% or greater.

LISTINGS: UL and CUL listed for Wet Location – covered ceiling. UL and CUL listed for Damp Location – horizontal wall mount. Optional UL certified IP65 per IEC 60598 (IP65 Option) – ceiling mount.



ORDERING INFORMATION (Ex: ES8-48-2-45L50K-DCC-1-DV-2H-PP-FS)

Model	Length	Lamp Qty/Lamp Type	Ballast/Driver Type	Ballast/Driver Qty	Voltage	Housing	Lens Type	Options
-------	--------	--------------------	---------------------	--------------------	---------	---------	-----------	---------

ES8

Nominal Length

24	2' (60.96cm)
36	3' (91.44cm)
48	4' (121.92cm)
96	8' (243.84cm)

Lamp Qty/Type

2' (60.96cm) Lengths	
2-14▲	F14T5
2-24	F24T5HO
2-17	F17T8

3' (91.44cm) Lengths

2-21	F21T5
2-25	F25T8

4' (121.92cm) Lengths

1-45L35K	45 Watt 3500K LED
1-45L40K	45 Watt 4000K LED
1-45L50K	45 Watt 5000K LED
1-67L35K	67 Watt 3500K LED
1-67L40K	67 Watt 4000K LED
1-67L50K	67 Watt 5000K LED
1-90L35K	90 Watt 3500K LED
1-90L40K	90 Watt 4000K LED
1-90L50K	90 Watt 5000K LED
2-28▲	F28T5
2-32	F32T8
2-54	F54T5HO

8' (243.84cm) Lengths

(Lamp Qty per 4' (1.22m) Cross Section)

1-45L35K	45 Watt 3500K LED
1-45L40K	45 Watt 4000K LED
1-45L50K	45 Watt 5000K LED
1-67L35K	67 Watt 3500K LED
1-67L40K	67 Watt 4000K LED
1-67L50K	67 Watt 5000K LED
1-90L35K	90 Watt 3500K LED
1-90L40K	90 Watt 4000K LED
1-90L50K	90 Watt 5000K LED
2-28▲	F28T5
2-32	F32T8
2-54	F54T5HO

Ballast Type

DCC Dimming Constant Current (LED)	
IS	Elec <10% THD Instant Start (T8)
RS	Elec <10% THD Rapid Start (T5, T5HO, T8, Biax)
SB	Specified Ballast

Ballast Quantity

1	One
2	Two

Voltage

DV	120-277 Volts
347	347 Volt

Housing Options

2H	20-Ga CRS; Painted
PSH	20-Ga 304SS; Painted
5H	20-Ga 304SS; Brushed
PXH	20-Ga 316SS; Painted
XH	20-Ga 316SS; Brushed

Lens Type

PP	Pearlescent Polycarbonate
CP▼	Clear Polycarbonate

Options

EL*‡	Standard Lumen EL Pack (450 lumens) (n/a with LED)
PEL*‡	High Lumen EL Pack (1100 lumens) (n/a with LED)
SEL*‡	Specified EL Pack (n/a with LED)
LEL▲	LED Emergency Battery Backup (only available with 45L)
FS▲	Single Fuse & Holder
HC▲	Row Mount Hub Connector (see KO option)
KO^	Continuous Row Mount - .875" (2.22cm) diameter knockout in end caps (see HC option for Kenall supplied attachment connector)
TN120	120 Volt, 13 Watt Twin Tube NPF Night Light (n/a with LED)
TN277	277 Volt, 13 Watt Twin Tube NPF Night Light (n/a with LED)
IP65***	UL certified IP65 Listing (w/removable end caps – not suitable for continuous row mount)
TR	Tamper Resistant Torx® with center pin fastener
MS	Motion Sensor (4' only)

- ▲ n/a with 347V
- * Option not available with 2' (60.96cm) fixtures, with LED, or F21T5 lamps
- ** n/a with KO option
- ^ n/a with IP65 option
- ‡ 347V available only with F25T8/F32T8 Lamps
- Add .375" (.95cm) to overall length
- ▼ n/a with LED



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P: 800-4-Kenall

F: 262-891-9701

10200 55th Street Kenosha, Wisconsin 53144

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ENVIROSEAL™

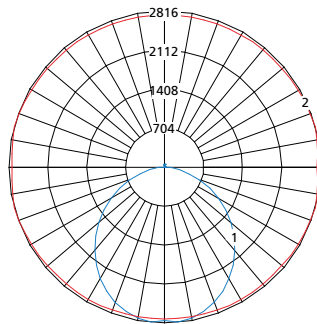
ES8 SERIES

PERFORMANCE

Lamp Type	Initial Delivered Lumens		Input Power (W)	Drive Current (mA)	Estd. L70 LED Life (hrs)
	@ 25°C (lm)	Efficacy (lm/W)			
45L35K	4,819	98	49	100	80,000
45L40K	5,138	105	49	100	80,000
45L50K	5,273	108	49	100	80,000
67L35K	7,373	101	73	75	80,000
67L40K	7,860	108	73	75	80,000
67L50K	8,067	111	73	75	80,000
90L35K	9,366	97	97	100	60,000
90L40K	9,985	103	97	100	60,000
90L50K	10,248	106	97	100	60,000

Displayed information above is for PP lens type. Info subject to change. Visit www.kenall.com for IES files and additional information.

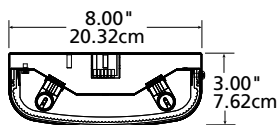
Model: FES8-48-67L40K-DCC-DV-2H-PP



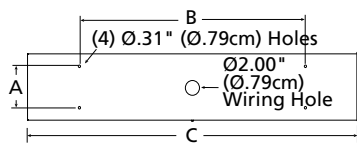
Max Candela = 2816 Located At Horizontal Angle = 15, Vertical Angle = 5
 1 - Vertical Plane Through Horizontal Angles (15 - 195) (Through Max. Cd.)
 2 - Horizontal Cone Through Vertical Angle (5) (Through Max. Cd.)

DIMENSIONAL DATA

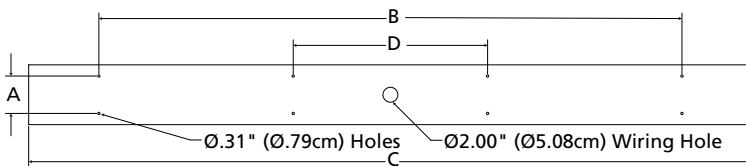
CROSS SECTION



BASEPLATE



96" (243.84cm) BASEPLATE



DIMENSIONAL DATA (IN INCHES & CENTIMETERS)

	A	B	C	D
ES824 - T5	5.00	16.00	23.13	
cm	12.70	40.64	58.75	
ES824 - T8	5.00	16.00	24.75	
cm	12.70	40.64	62.87	
ES836 - T5	5.00	20.00	35.00	
cm	12.70	50.80	88.90	
ES836 - T8	5.00	20.00	36.75	
cm	12.70	50.80	93.35	
ES848 - T5	5.00	32.00	46.75	
cm	12.70	81.28	118.75	
ES848 - T8	5.00	32.00	48.75	
cm	12.70	81.28	123.83	
ES848 - LED	5.00	32.00	48.75	
cm	12.70	81.28	123.83	
ES896 - T5	5.00	78.00	92.87	26.00
cm	12.70	198.12	235.89	66.04
ES896 - T8	5.00	78.00	96.78	26.00
cm	12.70	198.12	245.82	66.04



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APPENDIX J
POLYETHYLENE LINED STEEL FILTER SERIES BROCHURE

Simply the Best

Polyethylene Lined Steel Filter Series



Clean Water for the World

Balboa Park Bud Kearns Aquatic Complex Improvements
Appendix J - Polyethylene Lined Steel Filter System's Installation Guide

523 | Page

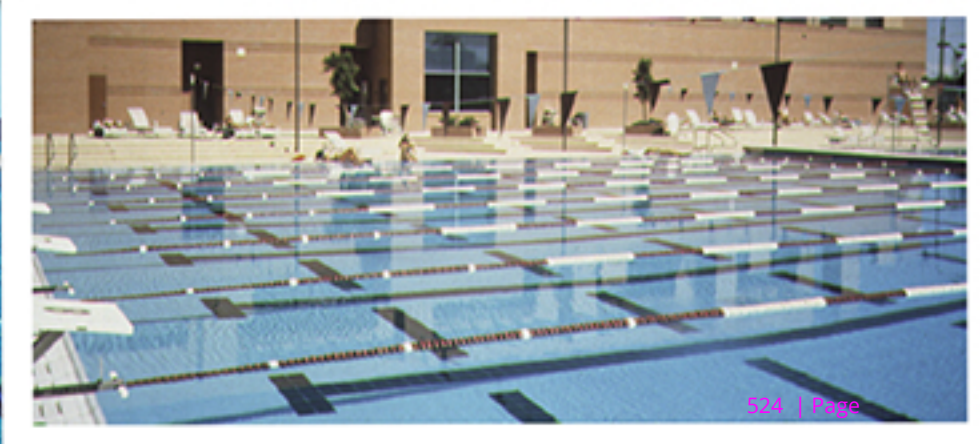
Hi-Rate Permanent Media Filtration Systems

Polyethylene lined steel filters...

EPD has 1,000's of installations worldwide...

Simply the best filter available today.

EPD's polyethylene lining is applied by the roto-mold process to create a bonded monolithic lining that is impact, abrasion and corrosion resistant. This filter is the only filter in the industry that is both NSF standard 50 and 61 listed and it comes with a generous 20 year prorated warranty.



Reliability and Durability



EPD's proven record of reliability and durability is shown in thousands of installations worldwide.

Since 1980 EPD USA Inc. has been building the world's finest filtration systems for pools, waterparks and water features, as well as applications from aquariums to zoos.



EPD HAS A STEEL FILTER SYSTEM THAT'S PERFECT FOR YOUR NEEDS.

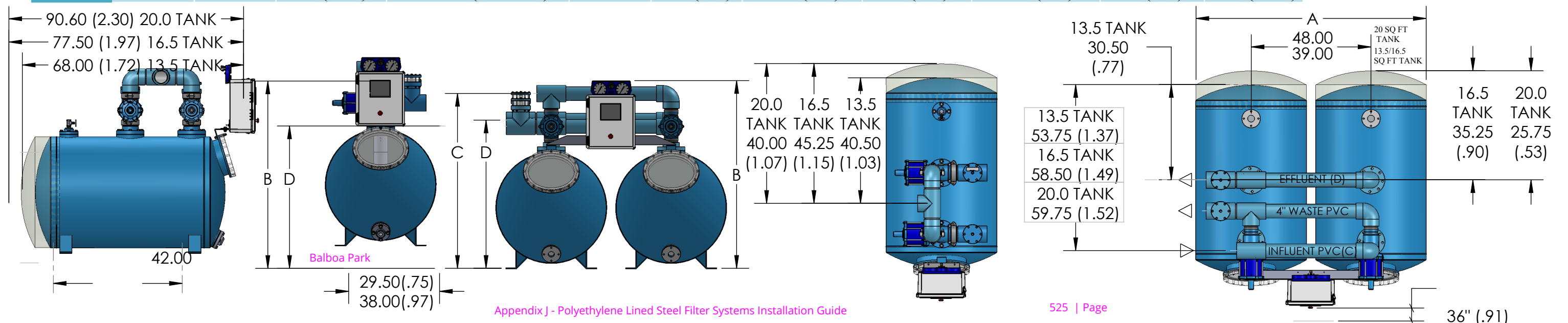
Industrial/Commercial, Hi-Rate, Permanent Media, Filtration Systems

	No. Tanks	Model #	Filter Area Ft ² (M ²)	Flow Rate GPM (M ³ /M)	Pipe Size	A	Height B	Influent C	Effluent D	Media Req. Ft ³ (M ³)	Operating Weight Lb(Kg)
8.2 FT²	1	EPD-138	8.2 (.76)	123-164 (.47-.62)	3"	36" (.91)	59" (1.5)	44" (1.12)	48" (1.22)	13 (.37)	2443(1108)
	No. Tanks	Model #	Filter Area Ft ² (M ²)	Flow Rate GPM (M ³ /M)	Pipe Size	A	Height B	Influent C	Effluent D	Media Req. Ft ³ (M ³)	Operating Weight Lb(Kg)
13.5 Ft	1	EPD-150	13.5 (1.25)	203-270 (.77-1.02)	4"	36" (.91)	61" (1.55)	57.5" (1.46)	47" (1.19)	17(.48)	4000(1814)
	2	EPD-200	27 (2.15)	405-540 (1.53-2.04)	4"	75" (1.9)	60.25" (1.53)	57.25" (1.45)	48.5" (1.23)	34(.96)	8000(3629)
	2	EPD-201	27 (2.5)	405-540 (1.53-2.04)	6"	75" (1.9)	62.5" (1.59)	58.5" (1.49)	49.75" (1.26)	34(.96)	8200(3719)
	3	EPD-300	40.5 (3.76)	608-810 (2.30-3.07)	6"	114" (2.9)	62.5" (1.59)	58.5" (1.49)	49.75" (1.26)	51(1.44)	12400(5624)
	3	EPD-301	40.5 (3.76)	608-810 (2.30-3.07)	8"	114" (2.9)	65.25" (1.66)	61" (1.55)	52.5" (1.33)	51(1.44)	12600(5715)
	4	EPD-401	54 (5.02)	810-1080 (3.07-4.09)	8"	153" (3.89)	65.25" (1.66)	61" (1.55)	52.5" (1.33)	68(1.93)	16800(7620)
	5	EPD-501	67.5 (6.27)	1013-1350 (3.83-5.11)	8"	192" (4.88)	67.75" (1.72)	61" (1.55)	52.5" (1.33)	85(2.41)	20900(9480)
	6	EPD-602	81 (7.53)	1215-1620 (4.60-6.13)	10"	231" (5.87)	71" (1.80)	63" (1.60)	54.4" (1.37)	102(2.89)	25700(11657)
7	EPD-701	94.5 (8.78)	1417-1890 (5.36-7.15)	10"	270" (6.86)	71" (1.80)	63" (1.60)	54.4" (1.37)	119(3.37)	29900(13562)	
8	EPD-800	108 (10.03)	1620-2160 (6.13-8.17)	10"	309" (7.85)	71" (1.80)	63" (1.60)	54.4" (1.37)	136(3.85)	35100(15921)	
	No. Tanks	Model #	Filter Area Ft ² (M ²)	Flow Rate GPM (M ³ /M)	Pipe Size	A	Height B	Influent C	Effluent D	Media Req. Ft ³ (M ³)	Operating Weight Lb(Kg)
16.5 Ft²	1	EPD-S104	16.5 (1.53)	248-330 (.94-1.25)	4"	36" (.91)	61" (1.55)	57.5"(1.46)	47" (1.19)	24(.60)	5030(2282)
	2	EPD-S206	33 (3.07)	495-660 (1.88-2.51)	6"	75"(1.9)	62.5" (1.59)	58.5" (1.49)	49.75" (1.26)	42(1.19)	9960(4109)
	3	EPD-S306	49.5 (4.6)	660-800 (2.51-3.04)	6"	114" (2.9)	62.5" (1.59)	58.5" (1.49)	49.75" (1.26)	63(1.78)	14790(6709)
	3	EPD-S308	49.5 (4.6)	742-990 (2.82-3.76)	8"	114" (2.9)	65.25"(1.66)	61" (1.55)	52.5" (1.33)	63(1.78)	14990(6799)
	4	EPD-S408	66 (6.13)	990-1320 (3.76-5.02)	8"	153" (3.89)	65.25"(1.66)	61" (1.55)	52.5" (1.33)	84(2.38)	20020(9081)
	5	EPD-S510	82.5 (7.66)	1237-1650 (4.7-6.27)	10"	192 (4.88)	71" (1.80)	63" (1.60)	54.4" (1.37)	105(2.97)	24350(11045)
	6	EPD-S610	99 (9.2)	1485-1960 (5.64-7.45)	10"	231" (5.87)	71" (1.80)	63" (1.60)	54.4" (1.37)	126(3.57)	29840(13535)
	7	EPD-S710	115.5 (10.73)	1732-2310 (6.58-8.78)	10"	270" (6.86)	71" (1.80)	63" (1.60)	54.4" (1.37)	147(4.16)	34730(15753)
8	EPD-S810	132 (12.26)	1980-2640 (7.52-10.03)	10"	309" (7.85)	71" (1.80)	63" (1.60)	54.4" (1.37)	168(4.76)	40380(18316)	
	No. Tanks	Model #	Filter Area Ft ² (M ²)	Flow Rate GPM (M ³ /M)	Pipe Size	A	Height B	Influent C	Effluent D	Media Req. Ft ³ (M ³)	Operating Weight Lb(Kg)
20 Ft²	1	EPD-120	20 (1.85)	300-400 (1.14-1.51)	6"	42" (1.07)	76.1" (1.93)	72.3"(1.84)	57" (1.45)	27(.76)	6109(2769)
	2	EPD-240	40 (3.70)	600-800(2.27-3.03)	6"	90"(2.29)	76.3" (1.94)	72.5" (1.84)	59" (1.50)	54(1.53)	12281(5570)
	3	EPD-360	60 (5.57)	900-1200(3.41-4.54)	8"	138" (3.51)	78.4" (1.99)	73.6" (1.87)	60.1" (1.52)	81(2.29)	18516(8399)
	4	EPD-480	80 (7.43)	1200-1600(4.54-6.06)	10"	186" (4.72)	81.2"(2.06)	75" (1.91)	61.9" (1.57)	108(3.06)	24884(11287)
	5	EPD-5100	100 (9.30)	1500-2000(5.68-7.57)	10"	234" (5.94)	83" (2.11)	75" (1.91)	61.9" (1.57)	135(3.82)	31142(14126)
	6	EPD-6120	120 (11.14)	1800-2400(6.81-9.09)	10"	282" (7.16)	83" (2.11)	75" (1.91)	61.9" (1.57)	162(4.95)	37674(17089)
	7	EPD-7140	140 (13.0)	2100-2800(7.95-10.60)	10"	330" (8.38)	83" (2.11)	75" (1.91)	61.9" (1.57)	189(5.35)	43987(19952)
	8	EPD-8160	160 (14.80)	2400-3200(9.09-12.11)	12"	378" (9.60)	85.6" (2.17)	76" (1.92)	61.6" (1.56)	216(6.12)	50300(22816)

Engineering Notes
Head loss through all EPD filters will vary dependent upon filter media and flow rate on start up. It is recommended that backwash occur when a 15 PSID (103.42kPaD) differential pressure is indicated on the system pressure gauges.

When sizing the main recirculating pump for the EPD Hi-Rate filter system, calculate head loss for maximum dirt load at 15 to 20 PSID (105.90 to 137.90 kPaD) through the filter and face piping.

Dimensions are not to be used for construction unless certified by the EPD engineering department. All tanks must be backwashed at a minimum of 15 gpm per sq. ft. (.61m3 per m2) of filter area.



Innovation: EPD is the originator of some of the industry's most important innovations.



Priority Valves



Backwash Sight Glass Valves



Pressure Amplification Systems



Polyethylene Lined Filters



Polyethylene Internal Components

World renowned backwash valves



EPD's cast bronze backwash valves set the standard for durability and reliability. Unlike diaphragm valves, EPD valves use a piston design with a failsafe return spring for a lifetime of flawless operation.



EPD's Aquatic Intelligence Filter Controllers

.... they make the job easier!



With its powerful programmable logic The AIF controller will schedule and backwash up to 16 filters, delay interim time periods between filter backwash, schedules circulation pump on off times to save energy and water.



Simple yet robust, the DP controller backwashes up to 8 filters based on differential pressure readings, has flow readout and analog gauges.



EPD's manual control is simple to use and incorporates our truly unique floating seal multiport valve for easy manual backwashing.



Our Vision

To Provide Clean Water for the World™

Our Values

EPD will serve the commercial filtration market by:

- Producing the best quality products at a reasonable price
- Strive to give outstanding customer service
- Add value to our products through commitment and integrity



APPENDIX K
MULTIPLE TANK FILTER SYSTEMS INSTALLATION GUIDE

INSTALLATION GUIDE

Multiple Tank Filter Systems



13.5 Steel

200
201
300
301
401
501
602
701
800

16.5 Steel

S206
S306
S308
S408
S510
S610
S710
S810

16.5 Comp

206C
306C
308C
408C
510C
610C
710C
810C

20 Steel

240
360
480
5100
6120
7140
8160



EPD Wearnes (USA), Inc.

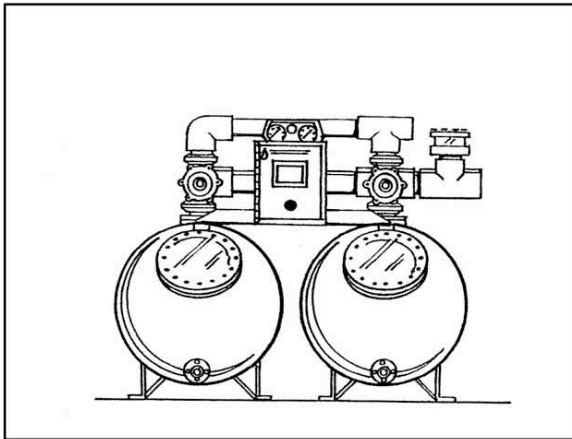
Clean Water for the World®

INTRODUCTION

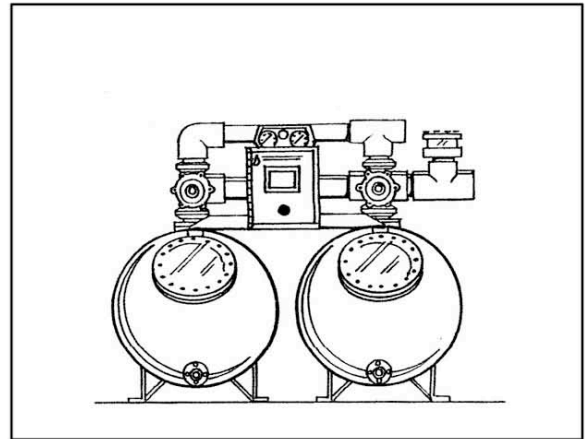
THE ASSEMBLY AND INSTALLATION OF THESE MULTIPLE TANK FILTER SYSTEMS INCORPORATE COMMON ASSEMBLY PROCEDURES. THE VARIABLES ARE TANK SIZES IN DIAMETER, LENGTH, MATERIAL CONSTRUCTION, TANK FEET OR MOLDED BASE TANK SUPPORT AND SIZE OF BACKWASH VALVE. INFLUENT AND EFFLUENT MANIFOLD SIZES RANGE FROM 4" THROUGH 12" DEPENDING ON THE FILTER SYSTEM MODEL. BACKWASH WASTE LINES ARE 4" OR 6" AND ALL MANIFOLDS MAY BE DIRECTED RIGHT OR LEFT OR A COMBINATION AS DESIRED. FOR DRINKING WATER SYSTEMS, BUTTERFLY VALVES ARE INSTALLED AT THE TANK INLET AND OUTLET PORTS.

WHEN ASSEMBLING THE VICTAULIC CONNECTIONS (SEAL AND GROOVED PORTS), APPLY A LIGHT FILM OF SILICONE LUBRICANT.

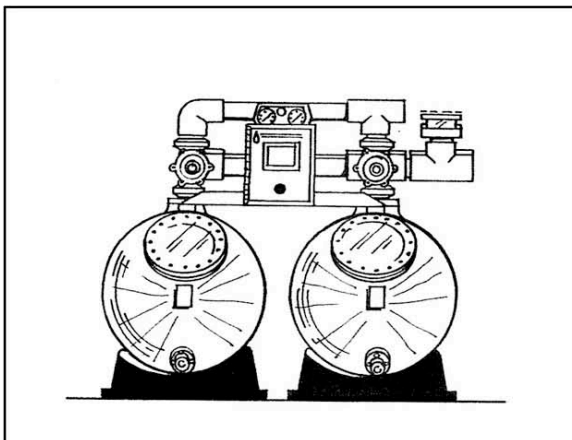
THE FOLLOWING SHOWS THE FOUR FILTER SERIES AS DEPICTED IN THESE ASSEMBLY AND INSTALLATION INSTRUCTIONS.



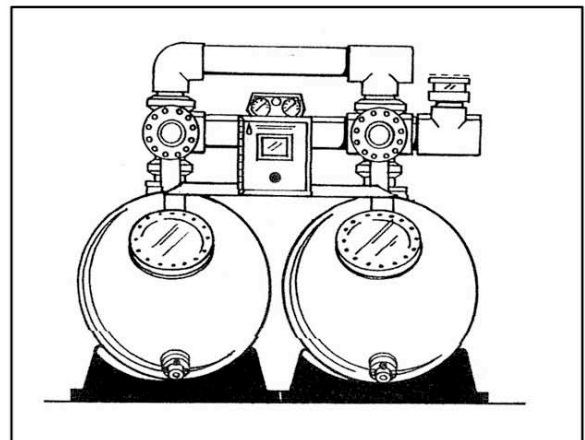
FILTER SYSTEM UTILIZING 13.5 FT² STEEL TANKS WITH 4" BACKWASH VALVES



FILTER SYSTEMS UTILIZING 16.5 FT² STEEL TANKS WITH 4" BACKWASH VALVES



FILTER SYSTEMS UTILIZING 16.5 FT² COMPOSITE TANKS WITH BASE AND 4" BACKWASH VALVES



FILTER SYSTEMS UTILIZING 20 FT² STEEL TANKS WITH BASE AND 4" OR 6" BACKWASH VALVES

DESIGN FEATURES OF THE EPD FILTER SYSTEM

EACH EPD FILTER SYSTEM IS MANUFACTURED TO STRINGENT ENGINEERING SPECIFICATIONS AND IS SUBJECTED TO RIGID QUALITY CONTROL, PERFORMANCE AND MATERIAL STANDARDS. WE AT EPD PROUDLY MANUFACTURE A FILTER SYSTEM THAT WILL PROVIDE MANY YEARS OF TROUBLE-FREE OPERATION.

YOUR FILTER SYSTEM EMPLOYS STATE-OF-THE-ART TECHNOLOGY IN COMPONENT FUNCTION AND DESIGN. ALL OF THE COMPONENTS MAKING UP THE EPD FILTER SYSTEM ARE MANUFACTURED IN OUR FACILITIES.

THE EPD HYDRAULICALLY OPERATED BACKWASH VALVES, USED ON ALL EPD FILTER SYSTEMS, ARE UNIQUE IN THAT THEY ARE CAST BRONZE, PROVIDING CORROSION FREE OPERATION. INTERNAL COMPONENTS ARE MACHINED TO EXACTING SPECIFICATIONS. ACTUATING CYLINDER UTILIZES RUGGED CUP SEALS FOR DURABILITY AND LONG SERVICE LIFE. A SELF-LUBRICATING SHAFT WIPER ASSEMBLY, AN EXCLUSIVE FEATURE OF THE EPD BACKWASH VALVE, IS INSTALLED ON THE VALVE SHAFT TO LUBRICATE SHAFT AND O-RINGS AUTOMATICALLY DURING EACH ACTUATION, PROVIDING SMOOTH TROUBLE-FREE OPERATIONS.

AN UNDERWRITERS LABORATORY LISTED SYSTEM CONTROLLER, AVAILABLE WITH EACH EPD FULLY AUTOMATIC FILTER SYSTEM, CONTROLS AND FAIL-SAFE GUARDS THE OPERATION OF THE FILTER SYSTEM WITH LOGIC PROVIDED BY A PROGRAMMABLE LOGIC CONTROLLER (PLC) WHILE PROVIDING DIRECT READOUTS FOR MODES OF OPERATION.

EPD'S SEMI-AUTOMATIC FILTER SYSTEMS ARE PROVIDED WITH A MANUALLY ACTUATED MULTI-PORT VALVE ASSEMBLY WITH INDICATOR DIAL WHICH PROVIDES FOR MANUAL MANIPULATION OF THE BACKWASH VALVES. THE MANUALLY MANIPULATED MULTI-PORT VALVE ALLOWS FOR FILTER SYSTEM BACKWASH. CONTROL OF CIRCULATION PUMP, ACCESSORIES, AND FAIL-SAFE GUARDS ARE NOT PROVIDED.

ALL INTERCONNECTING PIPING AND CONTROL VALVES PROVIDED WITH YOUR EPD FILTER SYSTEM ARE MANUFACTURED OF NONCORROSIVE OR SYNTHETIC MATERIALS AND ARE FACTORY ASSEMBLED, TESTED AND COLOR COATED FOR U.V. PROTECTION MATCHING ALL OTHER SYSTEM COMPONENTS.

THE FEATURES OF THESE SYSTEMS ARE IDENTICAL TO ALL OF THE SYSTEMS AS MANUFACTURED BY EPD WEARNES (USA), INC. VARIATIONS IN MANIFOLD SIZES, NUMBER AND MATERIAL OF TANKS, VALVES AND TYPE OF OPERATING CONTROLS CONSTITUTE THE DIFFERENT MODELS OFFERED. ALL EPD SYSTEMS ARE PRE-ENGINEERED FOR COMMONALITY OF MAJOR COMPONENTS SUCH AS TANKS, VALVES, PIPING, FILTER CONTROLLER, ETC. PIPING MANIFOLDS ARE REVERSIBLE FOR RIGHT OR LEFT PIPING CONFIGURATIONS AT THE INSTALLATION SITE.

ALL EPD FILTRATION SYSTEMS HAVE UNDERGONE EXTENSIVE PERFORMANCE AND SAFETY TESTING CONDUCTED BY INDEPENDENT, NATIONALLY RECOGNIZED TESTING LABORATORIES AND ARE LISTED AS DESIGNATED BY THEIR APPROPRIATE SEALS: U.L. (UNDERWRITERS LABORATORIES, INC.) AND N.S.F. (NATIONAL SANITATION FOUNDATION).

MANY YEARS OF TROUBLE-FREE PERFORMANCE MAY BE EXPECTED FROM YOUR EPD FILTRATION SYSTEM WITH A MINIMAL AMOUNT OF ATTENTION REQUIRED.

BASIC PRINCIPLE OF OPERATION

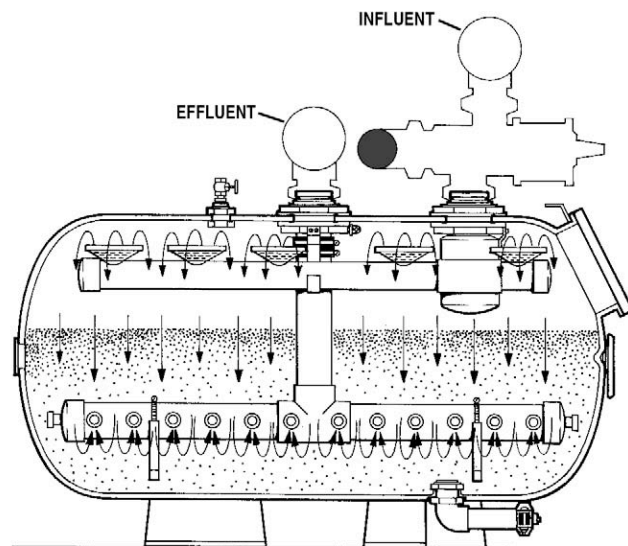
FILTRATION

INFLUENT (UNFILTERED) WATER IS DIRECTED INTO THE TANK AND ITS HYDRAULICALLY BALANCED DISTRIBUTOR. HIGH EFFICIENCY FILTRATION IS ACHIEVED THROUGH THE BALANCED HYDRAULIC FLOW DESIGN, RESULTING IN LOW DIFFERENTIAL PRESSURE LOSSES THROUGH THE EPD PERMANENT MEDIA FILTER. WATER TURBULENCE IS REDUCED TO VERY LOW LIMITS, AND FLOW PATHS AT THE MEDIA SURFACE ARE ALMOST WHOLLY PARALLEL AND VERTICAL. FLOW RATES IN EXCESS OF 20 GALLONS PER MINUTE, PER SQUARE FOOT (.81M³/MIN/M²) OF FILTER AREA, CAN BE ACHIEVED WITHOUT CHANNELING THE MEDIA BED.

AT HIGH FLOW RATES, COLLECTED SOLIDS ARE FORCED INTO THE MEDIA, BUT SELECTION OF SMALL MEDIA ENABLES EXCELLENT FILTRATION TO BE ACHIEVED. LONG FILTER CYCLES BETWEEN BACKWASHES OF THE EPD FILTERS IS ACCOMPLISHED, AS THE VOLUME OF SOLIDS COLLECTED ARE CONTAINED IN THE DEPTH OF THE MEDIA SELECTED.

THE LOWER COLLECTION SYSTEM RECEIVES WATER THROUGH ITS "V" SLOTTED LATERALS WHICH ARE DESIGNED TO REAIN VERY FINE FILTER MEDIA. THE FILTERED WATER EXITS VIA THE EFFLUENT TANK PORT.

FLOW DIAGRAM OF TANK IN FILTRATION MODE



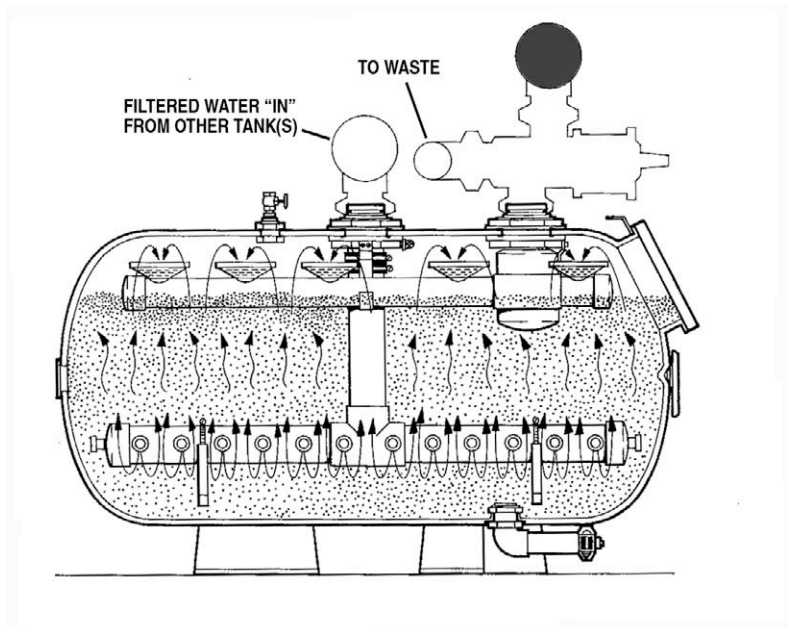
BACKWASH (REVERSE FLOW)

BACKWASHING IS A REVERSAL OF FLOW THROUGH THE FILTER TANK. EPD'S SINGLE TANK SYSTEMS USE SOURCE WATER FOR BACKWASHING. EPD MULTIPLE TANK SYSTEMS USE FILTERED WATER FROM THE ADJACENT TANK(S) IN THE SYSTEM. THE BACKWASH VALVE BEING ACTIVATED, ROUTES WATER THROUGH THE UNDERDRAIN COLLECTION SYSTEM OF THE FILTER TANK TO BE BACKWASHED. THIS REVERSAL OF FLOW DIRECTION FLUIDIZES THE MEDIA BED, CAUSING THE RELEASE OF COLLECTED SOLIDS.

CIRCULATION PATTERNS ARE ESTABLISHED TO PROGRESSIVELY PRESENT EACH PARTICLE OF THE MEDIA AT THE SURFACE ON APPROXIMATELY 30 SECOND CYCLES. THE BALANCED FLOW CONDITIONS, INDUCED BY EPD'S COLLECTION SYSTEM, REDUCES WATER VELOCITY TO BELOW THAT OF THE SETTLING RATE, PREVENTING LOSS OF FILTER MEDIA DURING THIS PHASE OF OPERATION.

THE UNWANTED SOLIDS, WHICH ARE RELEASED FROM THE MEDIA BED, ARE COLLECTED BY THE INFLUENT DIVERTER AND ARE DISCHARGED OUT OF THE TANK TO THE WASTE LINE PIPING.

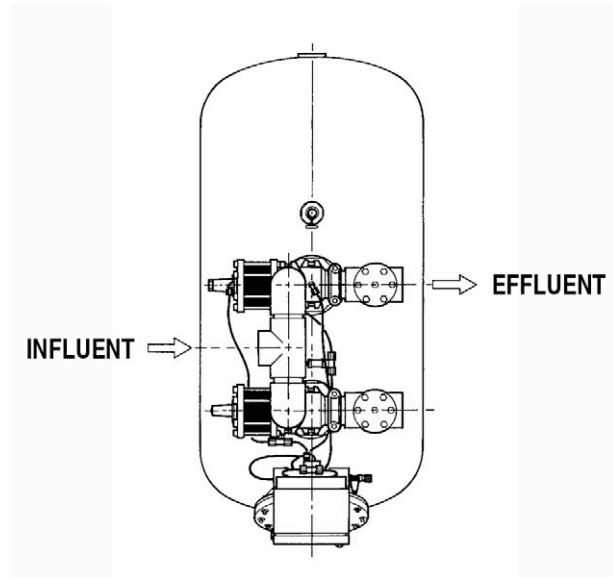
FLOW DIAGRAM OF TANK
IN BACKWASH MODE



SYSTEM FLOW DIAGRAM FOR EPD SINGLE TANK SYSTEMS

WATER TO BE FILTERED ENTERS THE INFLUENT MANIFOLD AND PASSES THROUGH THE BACKWASH VALVES, FILTERS OUT PARTICLES THROUGH THE MEDIA BEDS OF ALL TANKS SIMULTANEOUSLY, AND PASSES OUT THE EFFLUENT.

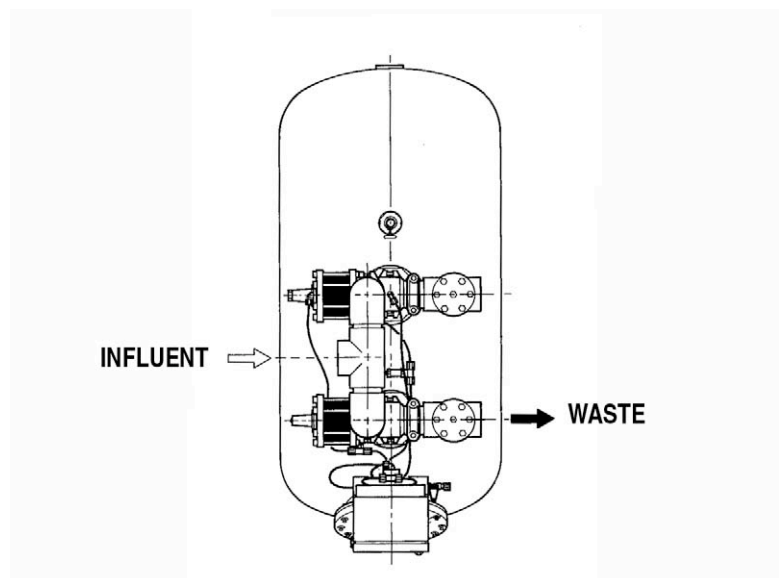
EPD SINGLE TANK SYSTEM
IN FILTRATION MODE



BACKWASH FLOW

BACKWASH IS ACCOMPLISHED WHEN WATER IS DIRECTED IN A REVERSE FLOW, TO THAT OF FILTRATION, FLUIDIZING THE MEDIA IN AN AGGRESSIVE SCRUBBING ACTION. THE COLLECTED SUSPENDED SOLIDS ARE RELEASED TO FLOW OUT OF THE FILTER SYSTEM TO WASTE.

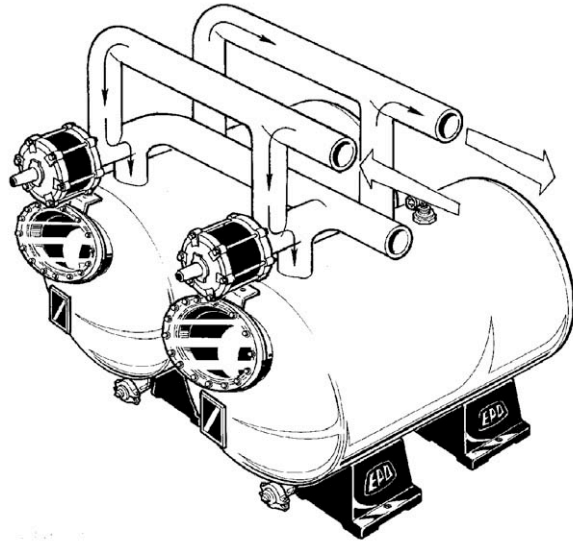
EPD SINGLE TANK SYSTEM
IN BACKWASH MODE



SYSTEM FLOW DIAGRAM FOR EPD MULTIPLE TANK SYSTEMS

WATER TO BE FILTERED ENTERS THE FILTER THROUGH THE INFLUENT MANIFOLD AND BACKWASH VALVE. THE WATER PASSES THROUGH THE FILTER MEDIA BED, LEAVING BEHIND SUSPENDED PARTICLES, AND PASSES OUT OF THE FILTER VIA THE REVERSE FLOW BACKWASH VALVE.

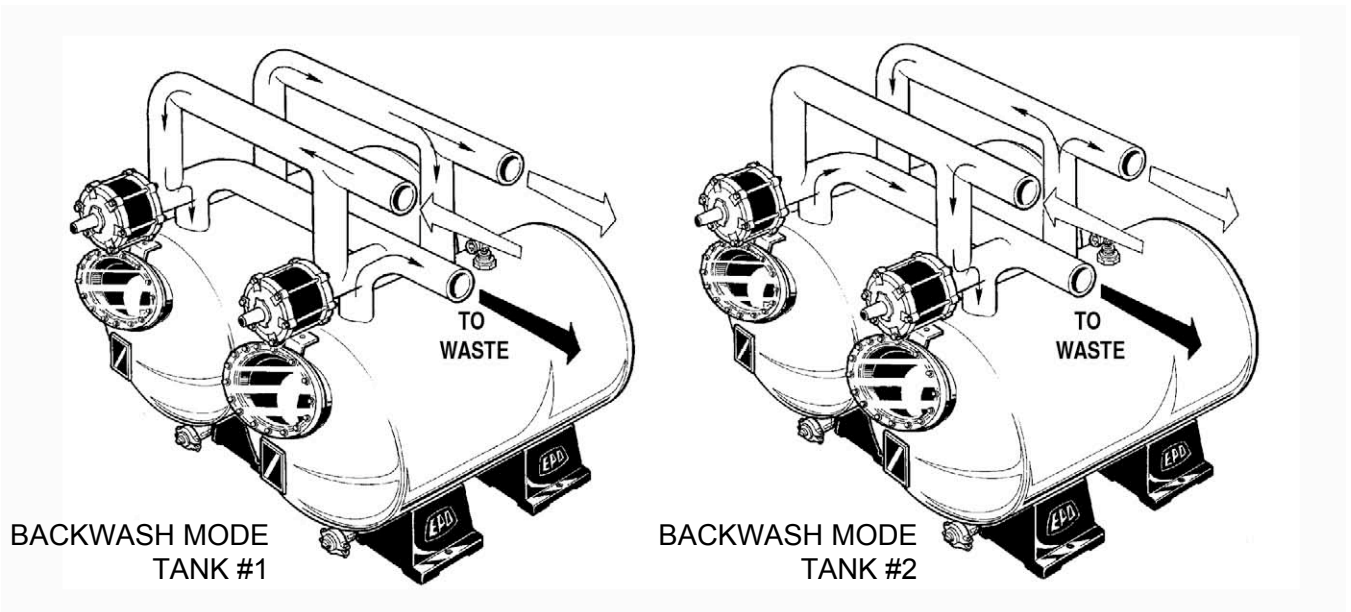
EPD TWO TANK SYSTEM
IN FILTRATION MODE.



FILTRATE BACKWASH FLOW

BACKWASH IS ACCOMPLISHED BY ROUTING HYDRAULIC PRESSURE VIA A MULTI-PORT VALVE (AUTOMATICALLY OR MANUALLY) TO EACH OF THE SYSTEMS BACKWASH VALVES IN A TIMED SEQUENCE.

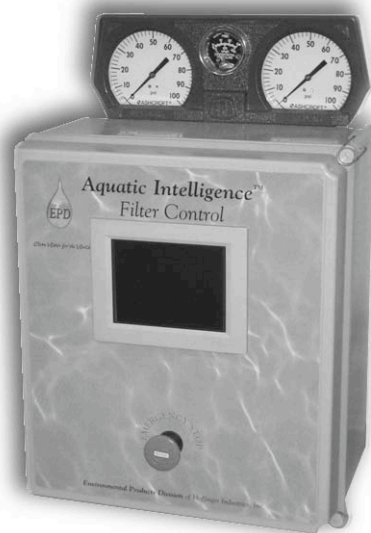
EACH FILTER TANK IS BACKWASHED INDEPENDENT OF THE OTHER FILTER TANKS WITHIN THE SYSTEM. FILTERED WATER FROM THE OTHER TANK(S) IS DIRECTED IN REVERSE THROUGH THE TANK BEING BACKWASHED TO FLUIDIZE THE MEDIA IN AN AGGRESSIVE SCRUBBING ACTION. THE COLLECTED SUSPENDED SOLIDS ARE RELEASED TO FLOW OUT OF THE FILTER SYSTEM TO WASTE.



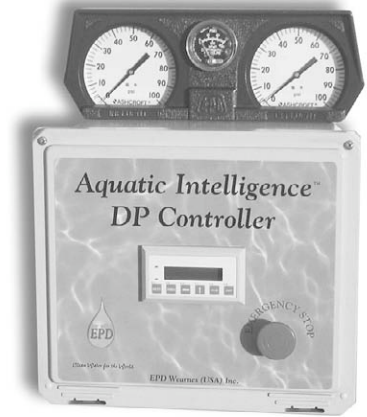
OPTIONAL FILTER CONTROLS ARE PROVIDED SEPARATELY



MANUAL SELECTOR
DIAL VALVE



(AIF) AQUATIC INTELLIGENCE
FILTER CONTROLLER



(D.P.) DIFFERENTIAL
PRESSURE CONTROLLER

REFER TO THE RESPECTIVE OWNERS GUIDE FOR THE FILTER CONTROL PROVIDED FOR INSTALLATION, ACCESSORIES, TUBING, ELECTRICAL REQUIREMENTS AND OPERATIONS.

ASSEMBLY AND INSTALLATION

FOLLOW THE EXPLODED SEQUENTIAL STEPS OF ASSEMBLY AND INSTALLATION REFERRING TO THE PLANNING ENGINEERS MECHANICAL DRAWINGS FOR THE POSITIONING OF FILTER AND FLOW DIRECTIONS OF ALL PIPING.

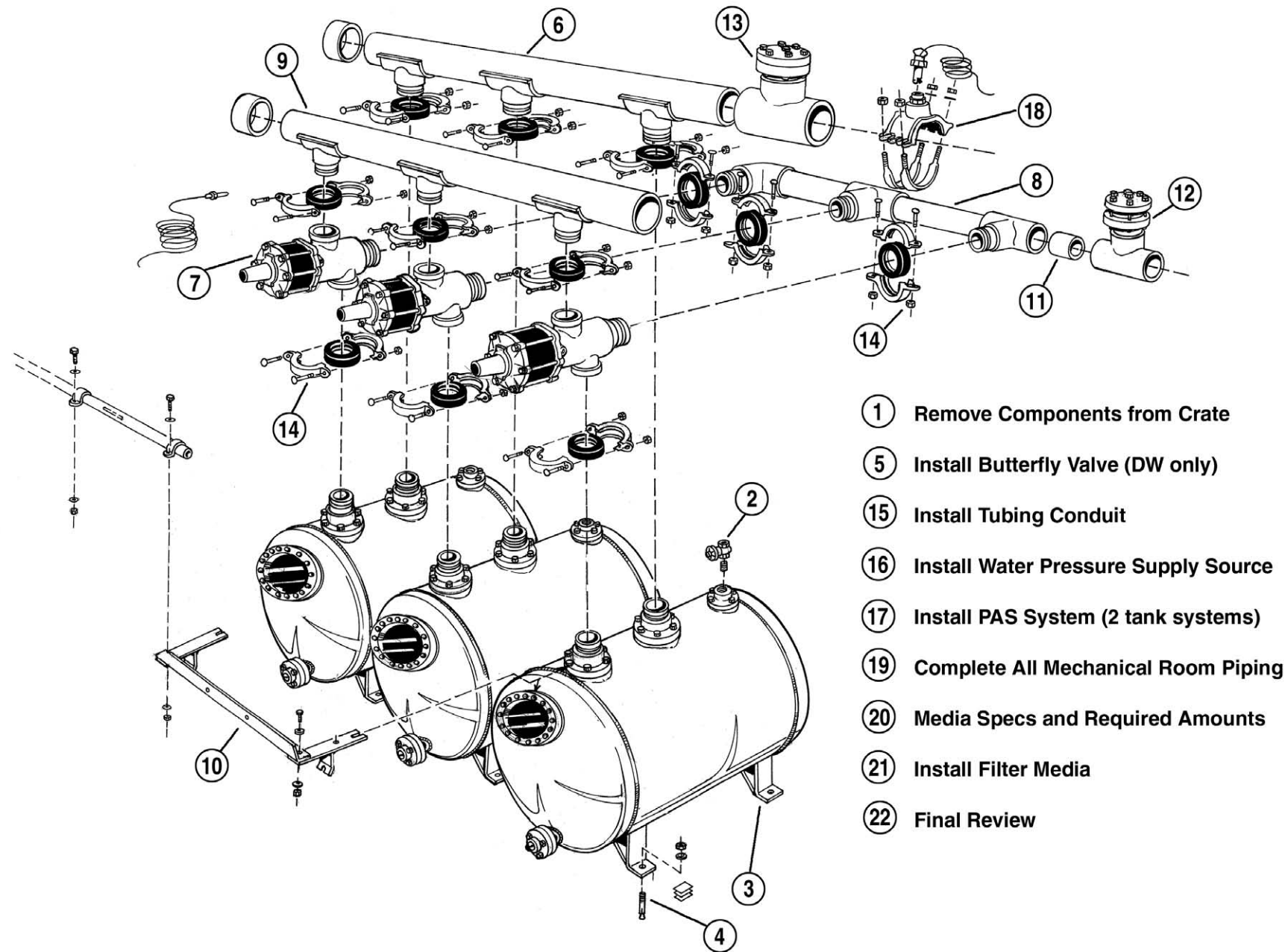
QUICK REFERENCE ASSEMBLY GUIDE

13.5 FT² STEEL TANKS WITH 4" BACKWASH VALVES

16.5 FT² STEEL TANKS WITH 4" BACKWASH VALVES

20 FT² STEEL TANKS WITH BASE AND 6" BACKWASH VALVES

16.5 FT² COMPOSITE TANKS WITH BASE AND 4" BACKWASH VALVES



- ① Remove Components from Crate
- ②
- ③
- ④
- ⑤ Install Butterfly Valve (DW only)
- ⑥
- ⑦
- ⑧
- ⑨
- ⑩
- ⑪
- ⑫
- ⑬
- ⑭
- ⑮ Install Tubing Conduit
- ⑯ Install Water Pressure Supply Source
- ⑰ Install PAS System (2 tank systems)
- ⑱ Complete All Mechanical Room Piping
- ⑳ Media Specs and Required Amounts
- ㉑ Install Filter Media
- ㉒ Final Review

STEP	PAGE	ASSEMBLY/INSTALLATION
1	9	REMOVE COMPONENTS FROM SHIPPING CRATES
2	9	INSTALL AIR RELIEF VALVES
3	10	TANK POSITIONING
4	10	POSITION TANKS & INSTALL ANCHORS
5	11	INSTALL BUTTERFLY VALVES (DW SYSTEMS ONLY)
6	12	INSTALL EFFLUENT MANIFOLD
7	13	INSTALL BACKWASH VALVES
8	13	INSTALL WASTE MANIFOLD
9	13	INSTALL INFLUENT MANIFOLD
10	14	INSTALL FILTER CONTROL MOUNTING BRACKET
11	14	INSTALL NIPPLES INTO 4" MANIFOLDS
12	15	INSTALL BACKWASH SIGHTGLASS VALVE
13	16	INSTALL RATE OF FLOW/PRIORITY VALVES
14	16	SECURE ALL COUPLINGS, NUTS AND BOLTS
15	16	INSTALL TUBING CONDUIT
16	17	INSTALL WATER PRESSURE SUPPLY SOURCE (PRESSURE AMPLIFICATION SYSTEM)
17	19	INSTALLATION OF PAS SYSTEM FOR TWO FILTER SYSTEMS
18	19	INSTALL EFFLUENT FLOW METER
19	21	COMPLETE ALL MECHANICAL ROOM PIPING
20	21	MEDIA SPECS AND REQUIRED AMOUNTS
21	23	INSTALL FILTER MEDIA
22	24	FINAL REVIEW
	25-41	EXPLODED VIEW AND PARTS LISTS

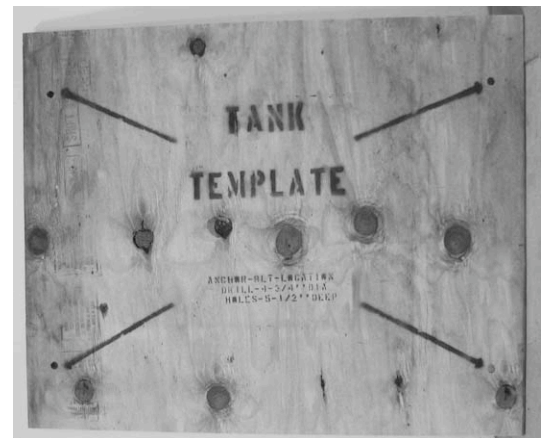
NOTE: DRAWING IS OF A TYPICAL EPD MULTI-TANK FILTER SYSTEM

ASSEMBLY/INSTALLATION

1 REMOVE COMPONENTS FROM SHIPPING CRATES

REMOVE THE FILTER TANKS FROM THEIR CRATES. **DO NOT REMOVE THE PROTECTIVE WRAPPING FROM THE FILTER TANKS.** THE FOAM WRAPPING IS INTENDED TO PROTECT THE FINISH COAT SURFACE DURING TRANSIT AND INSTALLATION. IT WILL PROTECT THE FINISH COAT FROM SOLVENT DRIPS, OVER-SPRAY, DUST, DIRT AND OTHER CONSTRUCTION CONTAMINANTS. REMOVE THE WRAPPING AFTER COMPLETING THE ENTIRE INSTALLATION PROCEDURE.

MOUNTED TO THE FILTER TANK CRATE, JUST BENEATH THE FILTER TANK, IS A “TANK POSITIONING TEMPLATE.” REMOVE THESE TEMPLATES AND SET ASIDE FOR FUTURE USE.



2 INSTALL AIR RELIEF VALVES

BEFORE POSITIONING THE FILTER TANK(S), ASSEMBLE THE AIR RELIEF VALVE(S) TO THE FILTER TANK(S) AIR RELIEF PORT(S). IF THE AIR RELIEF VALVE(S) ARE NOT INSTALLED AT THIS TIME, IT MAY BE NECESSARY TO CLIMB ON TOP OF THE FILTER TANK(S) TO ACCOMPLISH THIS ASSEMBLY LATER.

ELBOW(S), TEE(S) OR ADAPTOR(S) MAY BE INSTALLED INTO THE AIR RELIEF VALVE(S) TO DIRECT DISCHARGE TO FLOOR DRAIN. **NOTE: MANUAL AIR RELIEF SHOWN. TANKS ARE EQUIPPED WITH INTERNAL AUTOMATIC AIR RELIEF SYSTEM.** THE EXTERNAL AUTOMATIC AIR RELIEF VALVE IS INTENDED FOR DRINKING WATER SYSTEMS ONLY.



ELBOW(S), TEE(S) OR ADAPTOR(S) MAY BE INSTALLED INTO THE AIR RELIEF VALVE(S) TO DIRECT DISCHARGE TO FLOOR DRAIN. **NOTE: MANUAL AIR RELIEF SHOWN.**



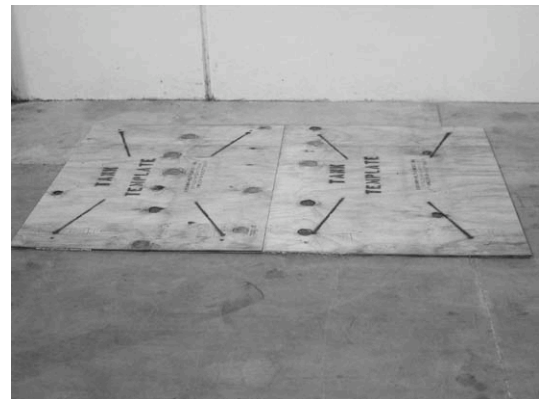
3 TANK POSITIONING

LAY OUT CHALK LINES ARE RECOMMENDED FOR MULTIPLE TANK INSTALLATIONS AND SHOULD BE LAID FOR POSITIONING THE FOUR LEGS OF EACH TANK. POSITIONING AND ANCHOR BOLT HOLE TEMPLATES ARE PROVIDED TO AID IN SETTING THE EPD FILTER TANK(S).

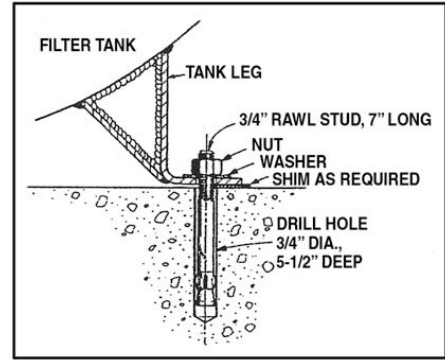
4 POSITION TANKS & INSTALL ANCHORS

POSITION THE “TANK POSITIONING TEMPLATES,” REMOVED FROM THE SHIPPING CRATE EARLIER, ALONG THE CHALK LINE. THE TEMPLATES, WHEN BUTTED TOGETHER SIDE BY SIDE, WILL ASSURE THE PROPER ALIGNMENT OF THE FILTER TANK TO FILTER TANK AND TANKS TO PIPING.

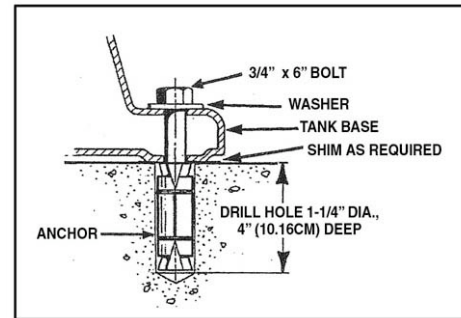
PICTURED ARE POSITIONING TEMPLATES BEING LAID OUT ON THE FLOOR. USE OF THE TEMPLATES ASSURES THAT THE TANKS WILL BE LOCATED ON EXACT 39”(99CM) CENTERS.



MARK THE HOLE LOCATIONS AND DRILL THE FOUR 3/4" (1.9CM) DIAMETER BY 5-1/2" (14CM) DEEP HOLES FOR EACH TANK. POSITION ONE TANK AT A TIME AND INSTALL THE ANCHOR BOLTS, WASHERS AND NUTS. SHIMS ARE PROVIDED TO LEVEL THE FILTER TANKS IN CASE OF AN UNEVEN FLOOR. FIRMLY SECURE ALL ANCHOR BOLTS.



MARK THE HOLE LOCATIONS AND DRILL THE FOUR 1-1/4" (3.17CM) DIAMETER BY 4" (10.16CM) DEEP HOLES FOR EACH TANK. POSITION ONE TANK AT A TIME AND INSTALL THE ANCHOR BOLTS, WASHERS AND NUTS. SHIMS ARE PROVIDED TO LEVEL THE FILTER TANKS IN CASE OF AN UNEVEN FLOOR. FIRMLY SECURE ALL ANCHOR BOLTS.



5 INSTALL BUTTERFLY VALVES (DRINKING WATER SYSTEMS ONLY)

FOR DRINKING WATER SYSTEMS ONLY, BUTTERFLY ISOLATION VALVES ARE REQUIRED ON EACH TANK INLET AND OUTLET PORTS BY MOST REGULATORY AGENCIES.

POSITION THE BUTTERFLY VALVES AND LIGHTLY LUBRICATED COUPLING SEALS ON EACH PORT WITH HANDLE LOCATED TO ALLOW FULL OPERATION OF THE HANDLE. ADJUST THE COUPLING SEAL ONTO THE VALVE TO A POINT THAT THE SEAL IS HALF ON THE PORT AND HALF ON THE VALVE CONNECTION.



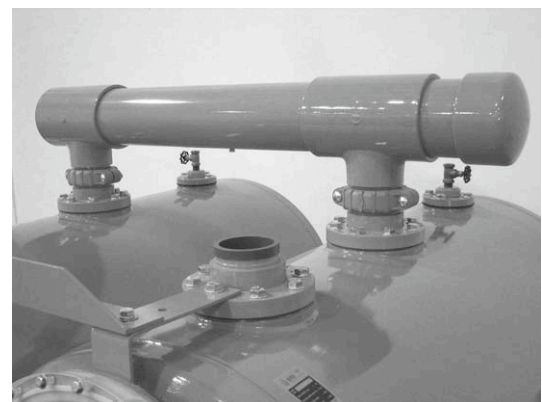
ASSEMBLE THE COUPLING HALVES AROUND THE COUPLING SEAL AND INTO THE GROOVES OF THE PORT AND VALVE CONNECTION. SQUEEZE THE COUPLING HALVES TOGETHER AND INSERT THE COUPLING BOLTS AND ATTACH THE NUTS FINGER TIGHT. NEXT, INSTALL ANOTHER LIGHTLY LUBRICATED SEAL ON THE OTHER END OF THE VALVE.



6 INSTALL EFFLUENT MANIFOLD

POSITION THE EFFLUENT MANIFOLD CONNECTION PORTS ON THE CENTER TANK PORTS. **NOTE: OPEN END (DISCHARGE) OF MANIFOLD MAY BE POSITIONED FOR EITHER RIGHT OR LEFT DISCHARGE. CONSULT ARCHITECTURAL AND/OR ENGINEERING INSTALLATION DRAWINGS FOR THIS FLOW DIRECTION INFORMATION. ADJUST THE COUPLING SEALS ONTO THE MANIFOLD CONNECTIONS TO A POINT THAT THE SEALS ARE HALF ON THE TANK PORT (VALVE PORT FOR DW SYSTEMS) AND HALF ON THE MANIFOLD CONNECTION PORTS.** ASSEMBLE THE COUPLING HALVES AROUND THE COUPLING SEAL AND INTO THE GROOVES OF THE CENTER TANK PORTS OR TOP GROOVE OF BUTTERFLY VALVE (DW SYSTEM ONLY) AND MANIFOLD CONNECTION PORTS. SQUEEZE THE COUPLING HALVES TOGETHER AND INSERT THE COUPLING BOLTS ATTACHING THE NUTS FINGER TIGHT. IF EITHER THE INFLUENT OR EFFLUENT MANIFOLDS HAVE DEVELOPED A BOW, A TRUCKER'S CINCH, WITH A HEAVY ROPE WRAPPED AROUND THE TANK (WHICH REPORTS NO CONTACT) MAY PROVIDE CONTACT ON LARGE DIAMETER MANIFOLDS. **NOTE: ALL COUPLING NUTS AND BOLTS SHOULD BE SECURE BUT NOT COMPLETELY TIGHTENED. ALL COUPLING NUTS AND BOLTS WILL BE TIGHTENED AFTER ALL MANIFOLDS ARE INSTALLED, AS SLIGHT ADJUSTMENTS TO THE TANKS' ALIGNMENT MAY BE REQUIRED.**

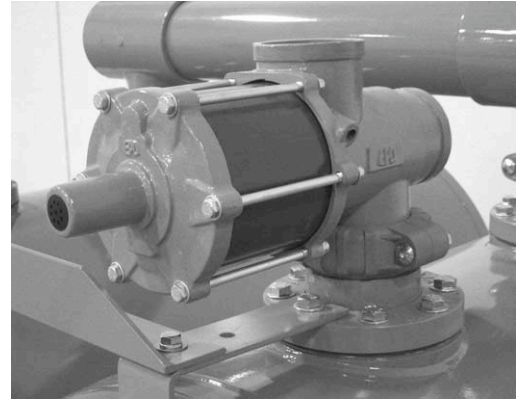
CARE SHOULD BE EXERCISED IN THE INSTALLATION OF THE MANIFOLD AND CLAMP ASSEMBLIES. DO NOT DROP THESE COMPONENTS ON THE FILTER TANK AS THEY MAY DAMAGE THE LUSTER OF THE FINISHED COATING.



7 INSTALL BACKWASH VALVES

4" BACKWASH VALVE

A LABEL IS AFFIXED TO THE SIDE OF THE BACKWASH VALVE AND INDICATES PROPER INSTALLATION. AFFIX THE COUPLING SEAL, COUPLING HALVES AND HARDWARE AS PREVIOUSLY DESCRIBED. TIGHTEN THE COUPLING ASSEMBLIES SUFFICIENTLY TO SUPPORT THE VALVE AND PIPING TO BE ADDED.

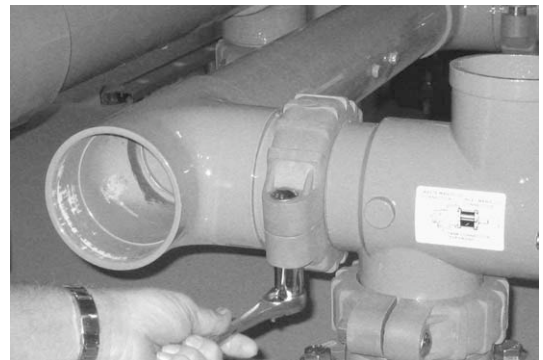


8 INSTALL WASTE MANIFOLD

THE WASTE MANIFOLD WILL NOW BE INSTALLED. LOCATE THE PROPER NUMBER OF COUPLINGS, COUPLING SEALS, NUTS AND BOLTS AND THE WASTE MANIFOLD. LUBRICATE AND POSITION THE COUPLING SEALS AS PREVIOUSLY DESCRIBED.

ATTACH THE WASTE MANIFOLD TO THE BACKWASH VALVE WASTE PORTS. ALIGN THE COUPLINGS SEALS, INSTALL THE CLAMP ASSEMBLIES AND TIGHTEN SUFFICIENTLY TO SUPPORT THE WASTE MANIFOLD.

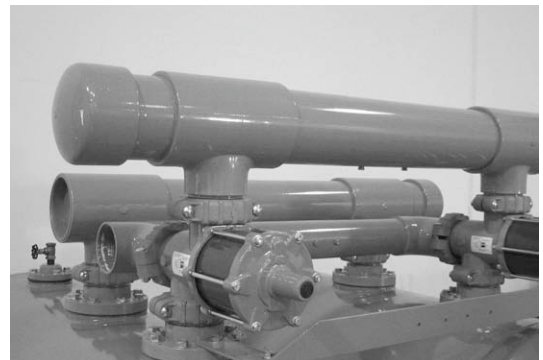
ONE END OF THE WASTE LINE MANIFOLD MAY BE SECURED WITH THE COUPLING HALVES, BUT NOT COMPLETELY TIGHTENED. THE OPPOSITE END MAY BE MOVED INTO POSITION AND SECURED WITH THE COUPLING HALVES. THEN, COMPLETE THE ASSEMBLY TO ALL VALVES IN BETWEEN.



9 INSTALL INFLUENT MANIFOLD

THE INFLUENT MANIFOLD IS INSTALLED AS SHOWN WITH COUPLING ASSEMBLIES INSTALLED AND SECURED AS PREVIOUSLY DESCRIBED.

INFLUENT MANIFOLD SHOWN WITH COUPLING ASSEMBLIES SECURED IN PLACE.

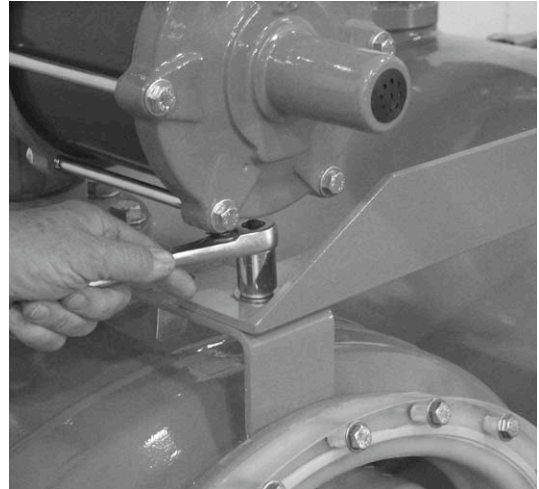


10 INSTALL FILTER CONTROL MOUNTING BRACKET

LOCATE THE FILTER CONTROL MOUNTING BRACKET AND NECESSARY HARDWARE IN THE HOOK-UP PACK. REFER TO THE PARTS LIST FOR PROPER BOLTS, NUTS AND WASHERS FOR THIS ASSEMBLY.

FILTER CONTROL MOUNTING BRACKET.

INSTALL THE MOUNTING BRACKET BETWEEN TWO TANKS. FOR SYSTEMS LARGER THAN TWO TANKS, THE FILTER CONTROL MAY BE INSTALLED BETWEEN TWO TANKS AT THE FAR RIGHT OR FAR LEFT. CONSULT ARCHITECTURAL AND/OR ENGINEERING DRAWINGS FOR PROPER LOCATION.



IT MAY BE NECESSARY TO ADJUST EITHER OF THE TWO TANKS TO ALIGN THE MOUNTING HOLES TO MATCH THE MOUNTING BRACKET HOLES. INSTALL 5/6" X 1" BOLT, WASHER AND NUT IN THE LEFT SIDE OF THE MOUNTING BRACKET AND TANK BRACKET FINGER TIGHT.

PLACE THE FILTER CONTROL MOUNTING BRACKET ON TANK MOUNTING BRACKETS WITH FLANGE OF BRACKET POINTING UP AND AWAY FROM TANK, AND ALIGN HOLES.

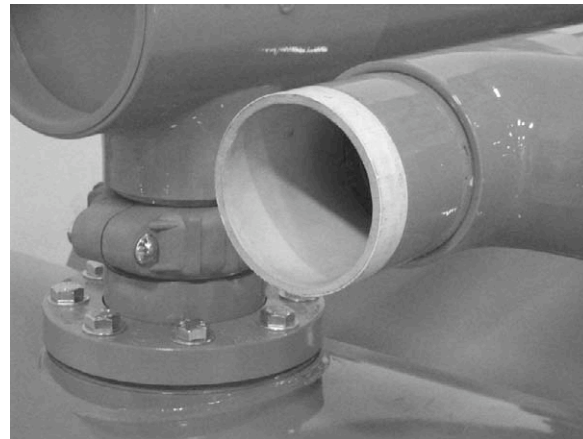
11 INSTALL NIPPLES INTO 4" MANIFOLDS FOR:

- A. EFFLUENT (PRIORITY OR RATE OF FLOW VALVE)
- B. BACKWASH SIGHT GLASS VALVE

VALVES FOR THE EFFLUENT AND WASTE LINES HAVE NOT BEEN INSTALLED TO ALLOW FOR INSTALLATION OPTIONS. IF 90° ELBOWS ARE DESIRED, THEY SHOULD BE INSTALLED NOW.

SYSTEMS WITH 4" PIPING REQUIRES A PVC NIPPLE (PROVIDED) TO BE SOLVENT WELDED INTO THE SOCKET PRIOR TO SOLVENT WELDING A 4" VALVE IN PLACE. FOLLOW SOLVENT CEMENT MANUFACTURERS INSTRUCTIONS.

COAT NIPPLE AND SOCKET GENEROUSLY WITH PVC SOLVENT CEMENT. QUICKLY PUSH THE 4" X CLOSE NIPPLE INTO THE SOCKET OF THE 4" WASTE MANIFOLD, ROTATING A 1/8 TO 1/4 TURN UNTIL BOTTOMING OUT. WIPE OFF ANY EXCESS SOLVENT CEMENT.

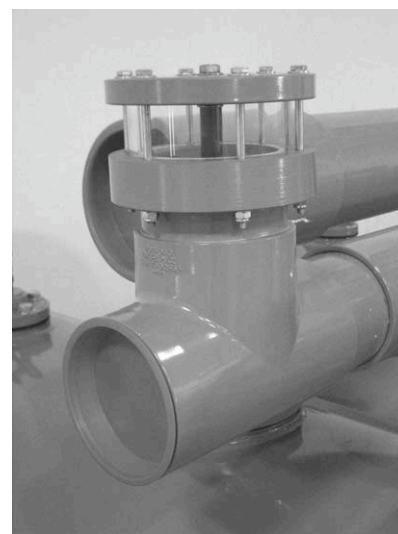


12 INSTALL BACKWASH SIGHT GLASS VALVE

APPLY A GENEROUS AMOUNT OF SOLVENT TO THE 4" X CLOSE NIPPLE AND THE SOCKET OF THE 4" BACKWASH SIGHT GLASS VALVE ASSEMBLY. QUICKLY PUSH THE BACKWASH SIGHT GLASS VALVE ASSEMBLY ONTO THE 4" NIPPLE, ROTATING A 1/8 TO 1/4 TURN UNTIL BOTTOMING OUT AND PROPER ALIGNMENT IS ACHIEVED. **CAUTION:** DO NOT ALLOW SOLVENT CEMENT TO RUN INSIDE THE VALVE BODY. EXCESSIVE SOLVENT WILL RENDER THE VALVE INOPERATIVE.

4" VALVE

WHEN SOLVENT WELDING ONTO THE 4" X CLOSE NIPPLE, ALIGN THE ASSEMBLY SO THE TOP OF THE SIGHT GLASS IS LEVEL. WIPE OFF ANY EXCESS SOLVENT CEMENT.



13 INSTALL RATE OF FLOW/PRIORITY VALVES

4" VALVE

FOLLOWING THE SAME PROCEDURE FOR INSTALLING THE 4" BACKWASH SIGHT GLASS VALVE, INSTALL THE PRIORITY OR RATE OF FLOW VALVE TO THE EFFLUENT MANIFOLD.

6" THRU 12" VALVES

FOLLOWING THE SAME PROCEDURE FOR INSTALLING THE 6" BACKWASH SIGHTGLASS VALVE, INSTALL THE 6" THRU 12" PRIORITY OR RATE OF FLOW VALVE TO THE EFFLUENT MANIFOLD.



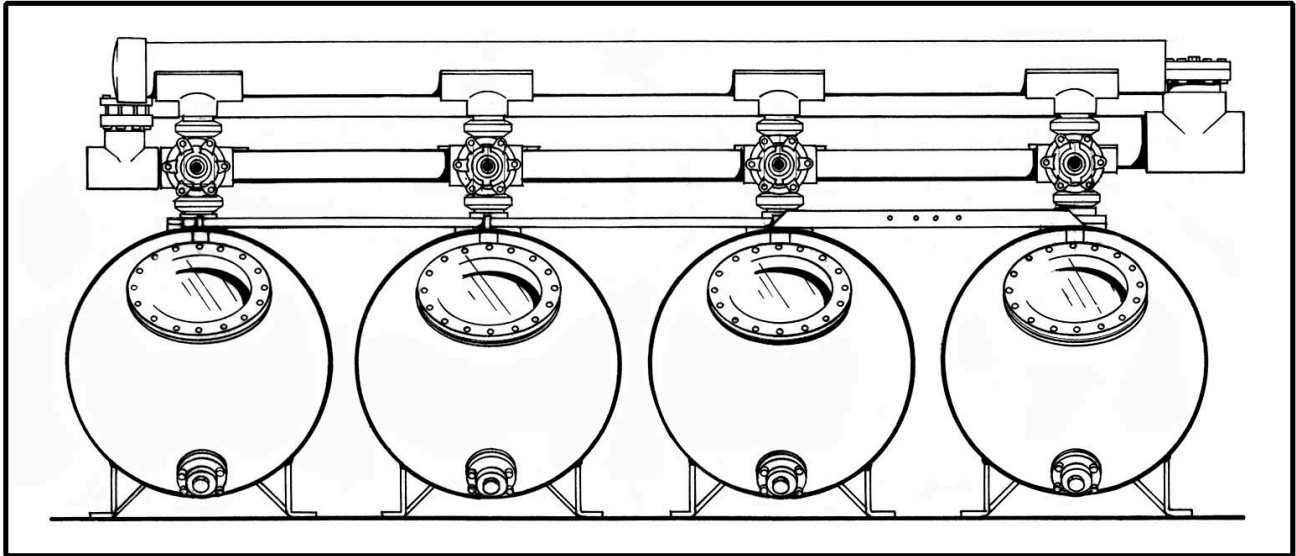
14 SECURE ALL COUPLINGS, NUTS & BOLTS

AT THIS TIME, MAKE SURE ALL COUPLINGS ARE SEATED IN THEIR RESPECTIVE GROOVES. TIGHTEN COUPLING NUTS AT ALL CONNECTIONS, I.E.; TANK INLET AND OUTLET PORTS, VALVES AND MANIFOLDS.

15 INSTALL TUBING CONDUIT

A TUBING CONDUIT IS PROVIDED WITH ALL NECESSARY MOUNTING HARDWARE FOR THE CONTAINMENT OF THE MANY PIECES OF TUBING CONNECTING THE FILTER CONTROL MULTI-PORT VALVE TO EACH BACKWASH VALVE. THE FILTER CONTROL MAY BE INSTALLED BETWEEN TWO TANKS AT THE FAR RIGHT OR FAR LEFT. THE TUBING CONDUIT SHOULD BE MOUNTED, STARTING AT THE OPPOSITE FAR END OF THE FILTER FROM THE FILTER CONTROLLER. REFER TO THE ARCHITECTURAL AND/OR ENGINEERING INSTALLATION DRAWINGS FOR THE FILTER CONTROL LOCATION.

POSITION THE TUBING CONDUIT ON TOP OF THE TANK MOUNTING BRACKETS AT THE FRONT OF THE TANKS. THE SLOT OPENINGS MUST BE FACING INWARD TOWARDS THE TANKS. POSITION THE TUBE CONDUIT CLAMPS AS SHOWN AND SECURE WITH HARDWARE PROVIDED. REFER TO EXPLODED PARTS LIST.



16 INSTALL WATER PRESSURE SUPPLY SOURCE (PRESSURE AMPLIFICATION SYSTEM)

ALL EPD FILTER SYSTEMS REQUIRE 50 PSI (344.76kPa) WATER PRESSURE SUPPLY TO THE FILTER CONTROL TO OPERATE THE FILTER'S BACKWASH VALVES.

TO AVOID THE NECESSITY OF INSTALLING EXPENSIVE BACKFLOW PREVENTOR AND PRESSURE SUSTAINING DEVICES, IT IS RECOMMENDED THAT A PRESSURE AMPLIFICATION SYSTEM BE INSTALLED.

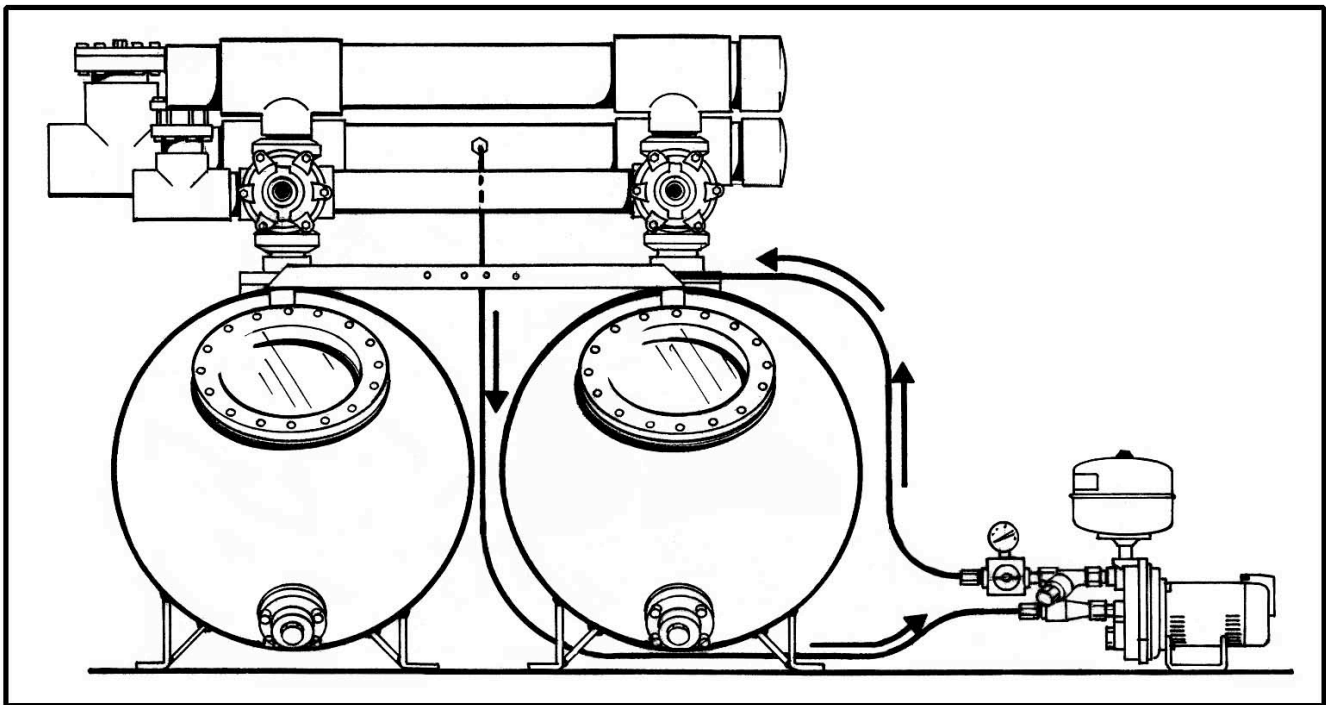
PRESSURE AMPLIFICATION SYSTEM
PART NO. 2-0020-076 60 Hz MODELS
PART NO. 2-0020-115 50 Hz MODELS



THE PRESSURE AMPLIFICATION SYSTEM IS A DEVICE DESIGNED TO PROVIDE AND MAINTAIN A CONSTANT REGULATED SOURCE OF WATER PRESSURE WITHIN THE HYDRAULIC SYSTEM OF THE EPD FILTER SYSTEMS FOR HYDRAULICALLY ACTUATING THE VALVES DURING BACKWASH. WHEN THE BACKWASH CYCLE IS INITIATED, THE PRESSURE AMPLIFICATION SYSTEM IS ACTIVATED EITHER MANUALLY BY WAY OF AN ON/OFF SWITCH OR AUTOMATICALLY THROUGH THE CONTROLLER. FILTERED WATER FLOWS FROM THE FILTERS EFFLUENT MANIFOLD INTO THE PRESSURE

AMPLIFICATION SYSTEM AND IS PRESSURIZED TO A REGULATED 50 PSI (344.7 kPa) IN THE HYDRO PNEUMATIC TANK. ON DEMAND, PRESSURE IS RELEASED INTO THE VALVE HYDRAULIC ACTUATING SYSTEM.

THE SYSTEM IS DESIGNED TO OPERATE INTERMITTENTLY. DURING THE BACKWASH CYCLE, THE PUMP RUNNING TIME IS GOVERNED BY AN ADJUSTABLE PRESSURE (CUT IN/CUT OUT) SWITCH. THIS FEATURE ALLOWS FOR DELIVERY OF ADEQUATE WATER UNDER PRESSURE BETWEEN PUMP CYCLES, PROVIDES ECONOMICAL SYSTEM OPERATION BY MINIMIZING PUMP STARTS, EXTENDS MOTOR LIFE AND SAVES ENERGY.



PLACE ASSEMBLED PRESSURE AMPLIFICATION SYSTEM IN ITS DESIRED LOCATION, ANCHORING THE UNIT TO THE FLOOR OR ITS MOUNTING PEDESTAL WITH APPROPRIATE HARDWARE (NOT PROVIDED BY EPD).

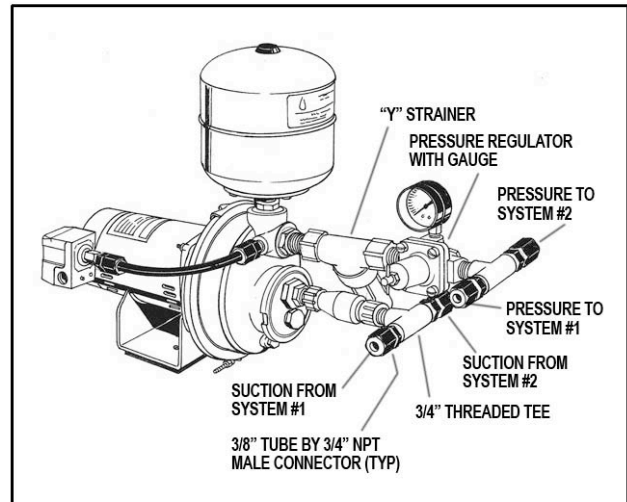
CONNECT THE PRESSURE AMPLIFICATION SYSTEM'S PUMP SUCTION (CHECK VALVE ASSEMBLY) TO THE EFFLUENT MANIFOLD. 1/4" NPT X TUBE FITTING AND TUBING ARE PROVIDED FOR THESE CONNECTIONS.

NOTE: THE CONNECTION TO THE MULTIPLE FILTER TANK SYSTEM EFFLUENT MANIFOLD MUST BE MADE BETWEEN THE FILTER TANKS AND THE PRIORITY VALVE OR THE RATE OF FLOW ADJUSTMENT VALVE. DO NOT MAKE THIS CONNECTION AFTER THE PRIORITY/RATE OF FLOW ADJUSTMENT VALVE. A SINGLE PRESSURE AMPLIFICATION SYSTEM WILL PROVIDE THE NECESSARY OPERATING PRESSURE TO EACH FILTER SYSTEM WHEN TWO FILTER SYSTEMS ARE INSTALLED.

17 INSTALLATION OF PAS SYSTEM FOR TWO FILTER SYSTEMS

THIS SPECIAL INSTALLATION WILL REQUIRE THAT YOU MAKE AN ADDITIONAL PURCHASE OF ONE (1) 3/4" X CLOSE NIPPLE, TWO (2) 3/4" THREADED TEES, ONE (1) 3/4" X 1/2" REDUCING BUSHING, ONE (1) 1/2" X CLOSE NIPPLES AND THREE (3) 3/4" NPT X 3/8" TUBING CONNECTORS. THESE FITTINGS REPLACE THE SINGLE TUBING CONNECTIONS TO THE PRESSURE AMPLIFICATION SYSTEM'S SUCTION AND PRESSURE CONNECTIONS TO PROVIDE BRANCH CONNECTIONS TO BOTH FILTER SYSTEMS.

PRESSURE AMPLIFICATION SYSTEM SHOWN WITH "TEES", "Y" STRAINER AND PRESSURE REGULATOR.



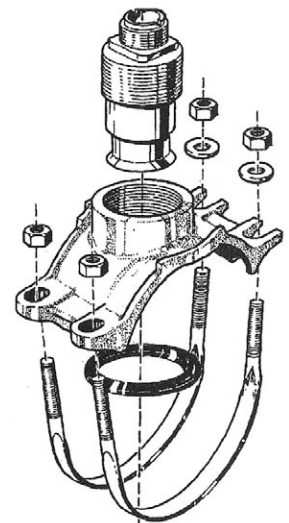
NOTE:

1. FOR WATER PRESSURE SUPPLY FROM CITY WATER SOURCE (WITHOUT THE EPD PRESSURE AMPLIFICATION SYSTEM), INSTALL THE "Y" STRAINER AND PRESSURE REGULATOR DIRECTLY TO THE CITY WATER LINE AND ROUTE 3/8" TUBING TO SOLENOID(S) ON THE FILTER SYSTEM. REGULATE PRESSURE TO 50 P.S.I.
2. THE WATER PRESSURE REGULATOR AND "Y" STRAINER IS PACKED WITH THE CONTROLLER.

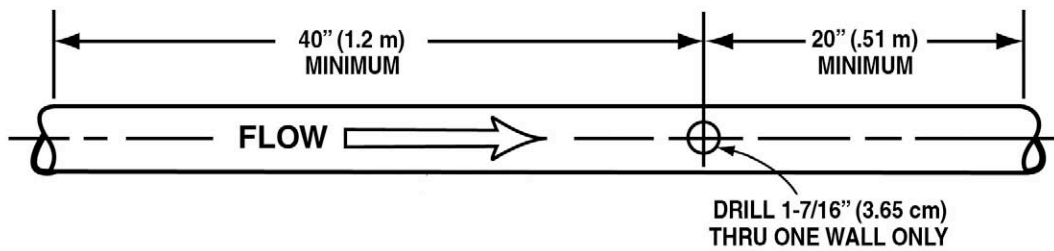
18 INSTALL EFFLUENT FLOW METER

IF A FLOW METER IS PROVIDED WITH YOUR FILTER SYSTEM, ESTABLISH THE DESIRED LOCATION OF THE FLOW METER SENSOR IN THE FILTER EFFLUENT LINE. DO NOT INSTALL THE FLOW METER SADDLE IN THE INFLUENT LINE AS DEBRIS MAY CLOG THE FLOW SENSOR RESULTING IN FALSE READING.

FLOW METER SADDLE ASSEMBLY



INSTALL THE FLOW METER SENSOR SADDLE ALLOWING A MINIMUM OF 10 PIPE DIAMETERS OF STRAIGHT PIPE UPSTREAM FROM THE SENSOR SADDLE AND FIVE (5) PIPE DIAMETERS DOWNSTREAM.



Pipe Size	A	B
4" (10cm)	40" (1.20m)	20" (.51m)
6" (15cm)	60" (1.52m)	30" (.76m)
8" (20cm)	80" (2.03m)	40" (1.02m)
10"(25cm)	100" (2.45m)	50" (1.27m)
12"(30cm)	120" (3.05m)	60" (1.52m)

AVOID INSTALLATION DIRECTLY DOWNSTREAM FROM HIGH TURBULENCE SUCH AS BUTTERFLY VALVES OR CHECK VALVES. A PARTIALLY OPENED BUTTERFLY VALVE MAY REQUIRE 20 TO 30 PIPE DIAMETERS OF FREE FLOW FOR ADEQUATE LIQUID STABILITY AT THE FLOW METER SENSOR.

TO ACCURATELY REGULATE THE BACKWASH FLOW RATE, INSTALL A FLOW METER SADDLE ASSEMBLY INTO THE WASTE LINE ACCORDING TO THE PREVIOUS INSTRUCTIONS FOR THE EFFLUENT FLOW METER. INSTALL THE SPECIAL SENSOR PLUG. YOUR REPRESENTATIVE WILL INSTALL A FLOW SENSOR AND REGULATE THE FLOW BY ADJUSTING THE BACKWASH SIGHT GLASS VALVE DURING THE INITIAL START-UP. THE SPECIAL SENSOR PLUG WILL BE RE-INSTALLED.

ASSEMBLE SADDLE, U-BOLTS AND NUTS AROUND PIPE OVER THE DRILLED HOLE. POSITION FLAT GASKET, PROVIDED, BETWEEN PIPE AND SADDLE PRIOR TO ASSEMBLY. SECURE IN PLACE BY TIGHTENING NUTS ON U-BOLTS.



19 COMPLETE ALL MECHANICAL ROOM PLUMBING

COMPLETE THE MECHANICAL ROOM PLUMBING CONNECTIONS. REFER TO ARCHITECTURAL AND/OR ENGINEERING DRAWINGS FOR PROPER LINE SIZING AND LOCATIONS.

NOTE: ALL WATER HEATING EQUIPMENT (BOILERS AND/OR HEAT EXCHANGER) AND CHEMICAL FEED EQUIPMENT (CHLORINATION, SODA ASH, CAUSTICS, ETC.), MUST BE INSTALLED ON THE EFFLUENT (DOWNSTREAM) SIDE OF THE FILTER SYSTEM. IT IS FURTHER RECOMMENDED THAT A CHECK VALVE ASSEMBLY BE INSTALLED BETWEEN HEATERS, FEED EQUIPMENT AND THE FILTER SYSTEM. BACKFLOW OF BOILER WATER AND CHEMICAL CONCENTRATES MAY CAUSE DAMAGE TO THE FILTER TANK INTERNALS. ALL PLUMBING SHOULD BE PERFORMED IN ACCORDANCE WITH LOCAL CODE REQUIREMENTS. ALLOW SUFFICIENT CURING OF PLUMBING JOINTS BEFORE PRESSURIZING THE PLUMBING. REFER TO PVC SOLVENT MANUFACTURER'S RECOMMENDATIONS FOR THE CURING TIME. EPD RECOMMENDS A 72 HOUR CURE TIME BEFORE PRESSURIZATION AND SYSTEM START-UP.

20 MEDIA SPECIFICATIONS AND REQUIRED AMOUNTS

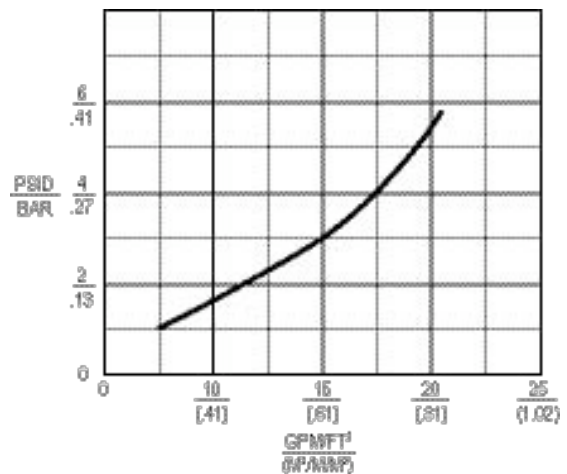
THE FOLLOWING CHART INDICATES THE QUANTITIES OF FILTER MEDIA SHOWN IN CUBIC FEET OR CUBIC METERS REQUIRED FOR YOUR FILTER SYSTEM.

MEDIA REQUIREMENTS

No. of Tanks	13.5 Steel Tank		16.5 Steel Tank		16.5 Comp Tank		20.0 Steel Tank	
	FT ³	M ³	FT ³	M ³	FT ³	M ³	FT ³	M ³
2	32	0.91	42	1.19	48	1.36	70	1.98
3	48	1.36	63	1.78	72	2.04	105	2.97
4	64	1.81	84	2.38	96	2.72	140	3.96
5	80	2.26	105	2.97	120	3.4	175	4.96
6	96	2.72	126	3.57	144	4.08	210	5.95
7	112	3.17	147	4.16	168	4.76	245	6.94
8	128	3.62	168	4.76	192	5.44	280	7.93

NOTE: STL REPRESENTS STEEL AND COMP. REPRESENTS COMPOSITE

HEAD LOSS CURVE FOR # 20 SILICA SAND AS REQUIRED BY THE NATIONAL SANITATION FOUNDATION (NSF) FOR HIGH RATE SAND FILTERS STANDARD 50.



MEDIA SPECIFICATIONS

#20 SILICA SAND - EFFECTIVE SIZE OF .45 MILLIMETER WITH UNIFORMITY COEFFICIENT OF 1.5 MAXIMUM.

SIEVE NO. (U.S. SERIES)	OPENING IN MILLIMETERS (MM)	OPENING IN INCHES (IN.)	PERCENT RETAINED ON SIEVE (BY WEIGHT)
20	0.833 MM	0.333 IN.	2
30	0.589 MM	0.023 IN.	58
40	0.417 MM	0.016 IN.	36
50	0.295 MM	0.012 IN.	4

#30 SILICA SAND - EFFECTIVE SIZE OF .27 MILLIMETER WITH A UNIFORMITY COEFFICIENT OF 1.6 MAXIMUM.

SIEVE NO. (U.S. SERIES)	OPENING IN MILLIMETERS (MM)	OPENING IN INCHES (IN.)	PERCENT RETAINED ON SIEVE (BY WEIGHT)
30	0.589 MM	0.023 IN.	2
40	0.417 MM	0.016 IN.	36
50	0.295 MM	0.012 IN.	46
70	0.208 MM	0.008 IN.	11
100	0.147 MM	0.0005 IN.	5

#50X GARNET - EFFECTIVE SIZE OF .27 MILLIMETER WITH A UNIFORMITY COEFFICIENT OF 1.7 MAXIMUM.

SIEVE NO. (U.S. SERIES)	OPENING IN MILLIMETERS (MM)	OPENING IN INCHES (IN.)	PERCENT RETAINED ON SIEVE (BY WEIGHT)
30	0.589 MM	0.023 IN.	2
40	0.417 MM	0.016 IN.	52
50	0.295 MM	0.012 IN.	35
70	0.208 MM	0.008 IN.	10
100	0.147 MM	0.0005 IN.	1

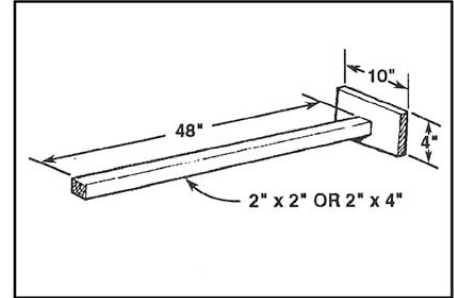
#60/80 GARNET - EFFECTIVE SIZE OF .18 MILLIMETER WITH A UNIFORMITY COEFFICIENT OF 1.61 MAXIMUM

SIEVE NO. (U.S. SERIES)	OPENING IN MILLIMETERS (MM)	OPENING IN INCHES (IN.)	PERCENT RETAINED ON SIEVE (BY WEIGHT)
40	0.417 MM	0.016 IN.	3
50	0.295 MM	0.012 IN.	35
70	0.208 MM	0.008 IN.	32
80	0.178 MM	0.007 IN.	12
100	0.147 MM	0.0005 IN.	10
PAN			8

21 INSTALL FILTER MEDIA

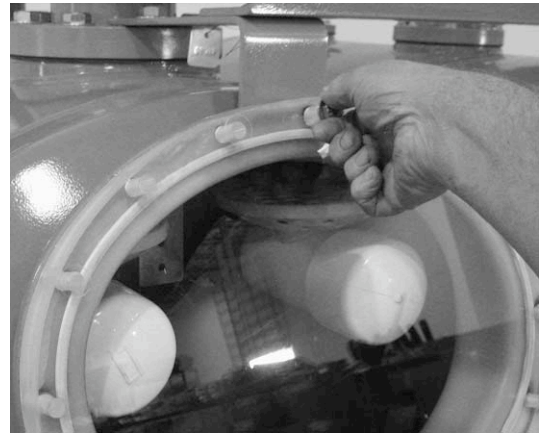
MAKE MEDIA LEVELING TOOL

CONSTRUCT A MEDIA LEVELING TOOL FROM SCRAP LUMBER AS SHOWN. IT WILL MAKE THE JOB MUCH EASIER.



REMOVE CLEAR COVERS

REMOVE THE CLEAR MANHOLE COVERS, BOLTS AND NUTS AND REMOVE THE GASKETS. TAKE CARE NOT TO DROP THE CLEAR COVERS TO PREVENT DAMAGE TO THE CLEAR VIEWING AREAS OR BREAKAGE.

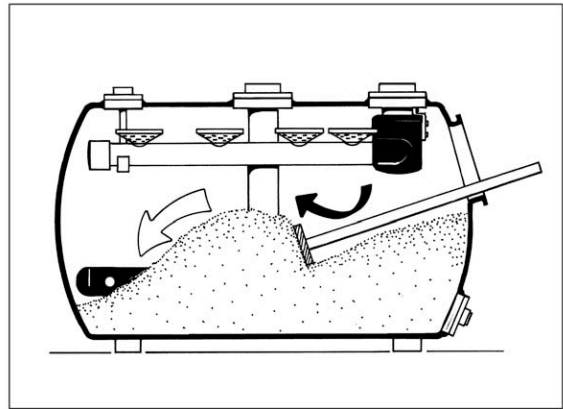


FILL TANKS

CUT OPEN TOP OF MEDIA BAGS AND REST ON EDGE OF MANHOLE RING OPENING WHILE POURING MEDIA INTO TANKS.

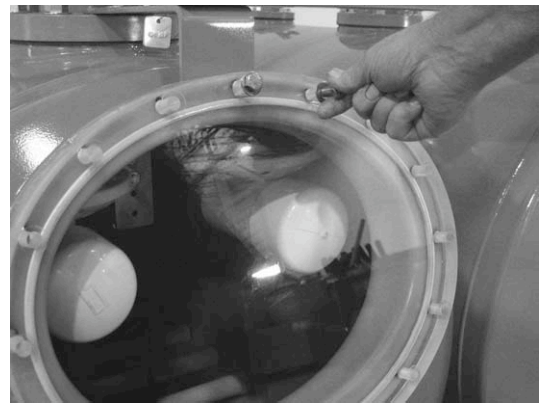


AS THE MEDIA PILES UP INSIDE THE TANK BEHIND THE MANHOLE RING, PUSH THE MEDIA TO THE REAR, LEVELING THE SURFACE AS YOU PROGRESS, USING THE LEVELING TOOL. TAKE CARE NOT TO DAMAGE THE INTERNAL LATERALS.



REPLACE CLEAR COVERS

RINSE OFF ANY MEDIA GRAINS FROM THE MANHOLE RING SURFACE. REPLACE THE CLEAR COVER AND GASKET WITH THE HARDWARE REMOVED DURING REMOVAL OF COVER. TIGHTEN BOLTS AND NUTS ALTERNATELY UNTIL FIRMLY SECURED.

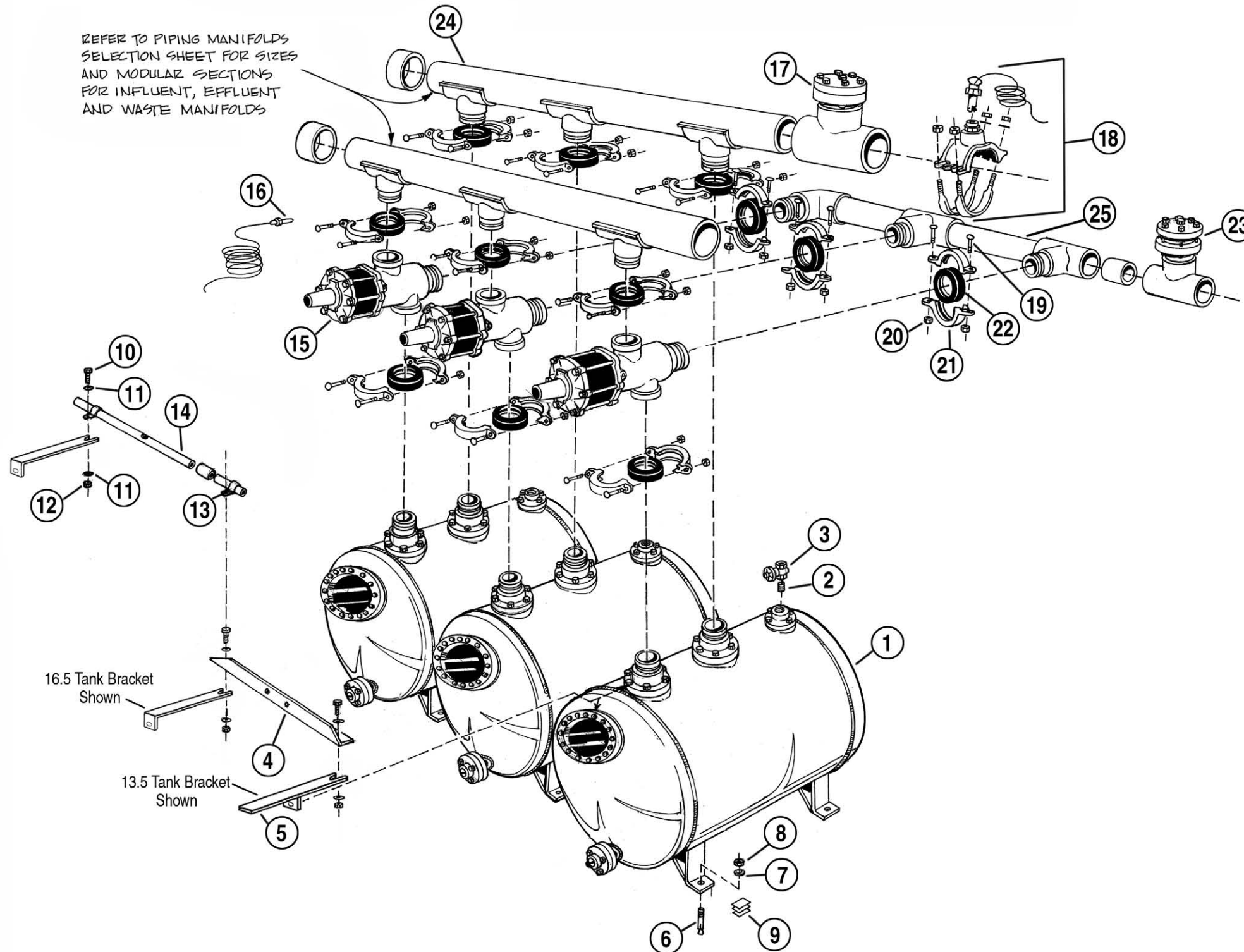


22 FINAL REVIEW

DOUBLE CHECK ALL PIPING CONNECTIONS TO MAKE SURE THEY ARE ALL SECURED. MAKE SURE ALL SOLVENT WELD JOINTS HAVE BEEN CEMENTED. REFER TO THE FILTER CONTROL INSTRUCTIONS GUIDE AND FOLLOW THE STEPS OF INSTALLATION.

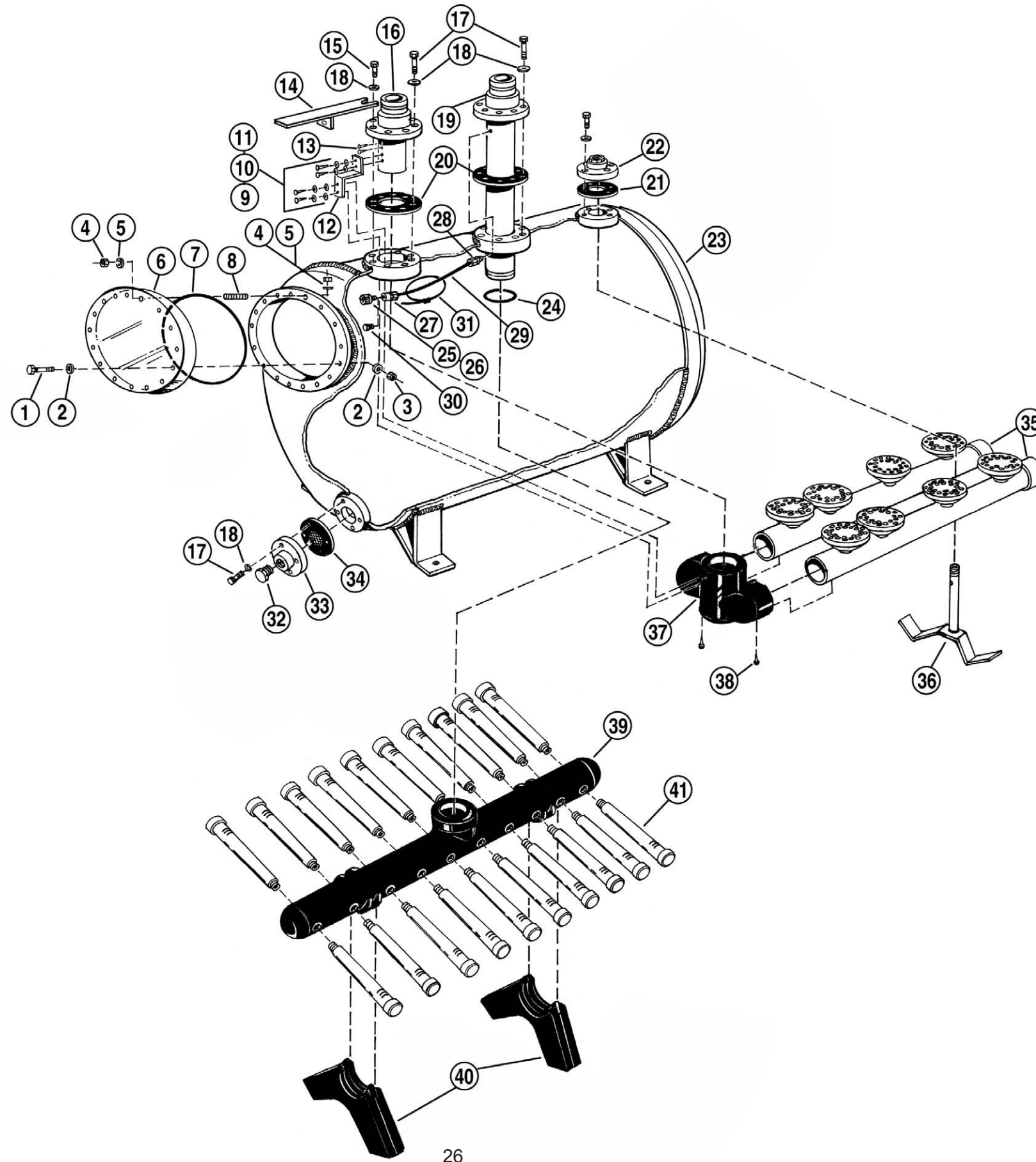
13.5 FT² AND 16.5 FT² STEEL TANK SYSTEM EXPLODED VIEW

13.5 FT² AND 16.5 FT² STEEL TANK SYSTEM PARTS LIST



STEEL TANK SYSTEM			
ITEM	DESCRIPTION	QUANTITY	PART NO.
1	13.5 Poly lined Steel Tank	2-0010-020	1
1	16.5 Poly lined Steel Tank	2-0010-022	1
2	3/4" Nipple	343-1040	1
3	3/4" Valve	393-1013	1
4	Filter Control Mounting Bracket	2-0020-181	1
5	13.5 Tank Bracket	385-1460	1
5	16.5 Tank Bracket	385-1461	2
6	3/4" Anchor	332-1137	4
7	3/4" Flat Washer	332-1010	4
8	3/4"-10 - 6" Bolt	330-1247	4
9	Tank Shim	385-1183	16
10	1/2" x 1 1/2" Hex Bolt	330-1150	1
11	1/2" Lock Washer	326-1014	1
12	1/2" Nut	320-1012	1
13	Conduit Clamp	387-1008	1
14	41" Tubing Conduit	344-1031	1
15	4" - 3 Way, Hydraulic BW Valve	2-0020-171	1
16	10' Temperature Probe	303-2087	1
17	4" Priority Valve	2-0020-173	1
17	6" Priority Valve	2-0020-174	1
17	8" Effluent Valve	2-0020-121	1
17	10" Effluent Valve	2-0020-122	1
17	12" Effluent Valve	2-0020-140	1
18	4" Flow Sensor Kit	2-0020-212	1
18	6" Flow Sensor Kit	2-0020-213	1
18	8" Flow Sensor Kit	2-0020-211	1
18	10" Flow Sensor Kit	2-0020-214	1
18	12" Flow Sensor Kit	2-0020-215	1
19	7/16" x 3" Carriage Bolt	324-1047	6
20	7/16" Nut	321-1044	6
21	4" Grooved Coupling Half	340-2313	6
22	4" Grooved Coupling Seal	308-1050	3
23	4" Backwash Sight Glass Valve	2-0020-179	1
24	4" 2 Tank Manifold	1107-1185	1
24	6" 2 Tank Manifold	1107-1188	1
24	6" 3 Tank Manifold	1107-1203	1
24	8" 4 Tank Manifold	1107-1215	1
24	8" 5 Tank Manifold	1107-1218	1
24	10" 5 Tank Manifold	1107-1507	1
24	10" 6 Tank Manifold	1107-1194	1
24	10" 7 Tank Manifold	1107-1200	1
24	10" 8 Tank Manifold	1107-1286	1
25	4" 2 Tank Waste Manifold	1107-1615	1
25	4" 3 Tank Waste Manifold	1107-1150	1
25	4" 4 Tank Waste Manifold	1107-1153	1
25	4" 5 Tank Waste Manifold	1107-1156	1
25	4" 6 Tank Waste Manifold	1107-1159	1
25	4" 7 Tank Waste Manifold	1107-1162	1
25	4" 8 Tank Waste Manifold	1107-1289	1

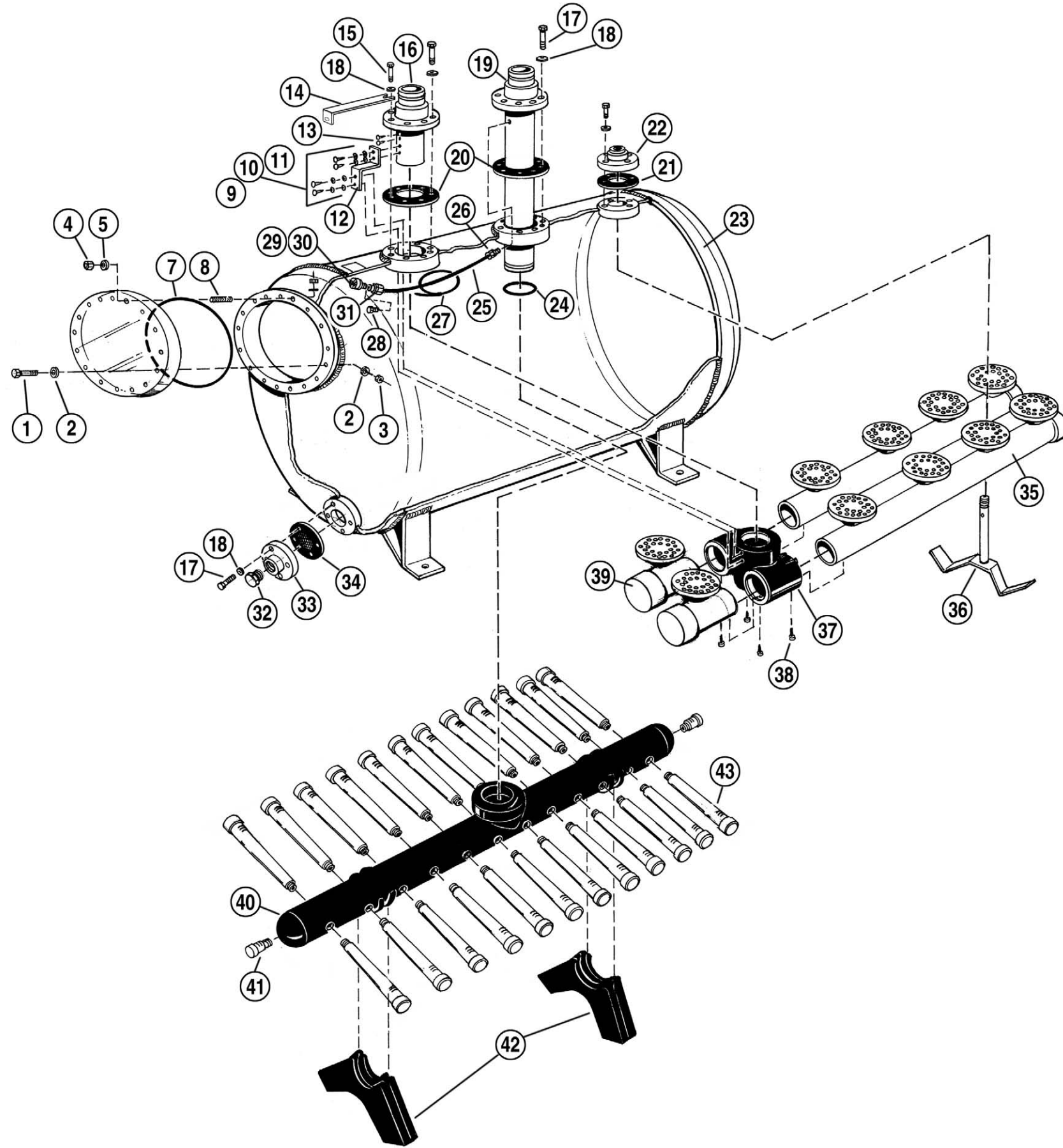
**13.5 FT² STEEL
INTERNAL PARTS – EXPLODED VIEW**



**13.5 FT² STEEL
INTERNAL PARTS – PARTS LIST**

13.5 FT ² STEEL – INTERNAL PARTS			
ITEM	DESCRIPTION	QUANTITY	PART NO.
1	3/8-16 x 2 3/4" Hex Bolt SS	330-1233	15
2	3/8" Flat Washer	327-1003	30
3	3/8-16 UNC Hex Nut SS	321-1003	15
4	1/2-13 UNC Hex Nut SS	321-1011	2
5	1/2" Flat Washer SS	327-1014	2
6	Clear Manhole Cover	344-1243	1
7	Manhole O-Ring Gasket	308-1223	1
8	1/2-13 x 4" Stud SS	376-1074	1
9	1/4-20 x 3/4" Hex Head Bolt	324-1016	4
10	1/4" Flat Washer SS	327-1011	4
11	1/4" Lockwasher SS	326-1012	4
12	Dist Zee Bracket	385-1427	1
13	1/4-20 x 1/4" Set Screw SS	330-1038	2
14	13.5 Steel Tank Bracket	385-1460	1
15	5/8-11 x 2-1/2" Hex had Bolt	330-1284	1
16	Influent Riser	1107-1670	1
17	5/8-11 x 2 1/2" Hex Head Bolt	324-1049	23
18	5/8" Flat Washer	327-1069	24
19	Effluent Riser	1107-1675	1
20	4" Flange Gasket	308-1183	2
21	2" Flange Gasket	308-1111	2
22	2" Air Relief Flange	1107-1674	1
23	Flanged 13.5 Steel Tank	385-1429	1
24	Wall O-Ring	308-1026	1
25	Suction Screen Strainer	343-1213	1
26	Hex Pipe Nipple	343-1052	1
27	3/8" Tube x 1/4" NPT Fem. Connct.	343-1056	1
28	3/8" x 1/4" NPT Male Connector	343-1055	1
29	3/8" Seal Tubing 36" Long	341-1112	1
30	1/4" NPT Plug	343-1212	1
31	6-1/2" Hose Clamp	387-1236	1
32	3/4" Tank Drain Plug	343-1345	1
33	2" Drain Flange	1107-1678	1
34	Media Screen Gasket	348-1051	1
35	Distribution Manifold Assy.- Long	1107-1422	2
36	Manifold Support Bracket	1104-1117	1
37	Distribution Collector Header	340-1851	1
38	#14 x 1 1/2" Flat Head Screw	330-1212	2
39	Collection Manifold	340-2166	1
40	Manifold Support Leg	340-2167	2
41	Lateral - 12" Long	1116-1226	20

**16.5 FT² STEEL
INTERNAL PARTS – EXPLODED VIEW**

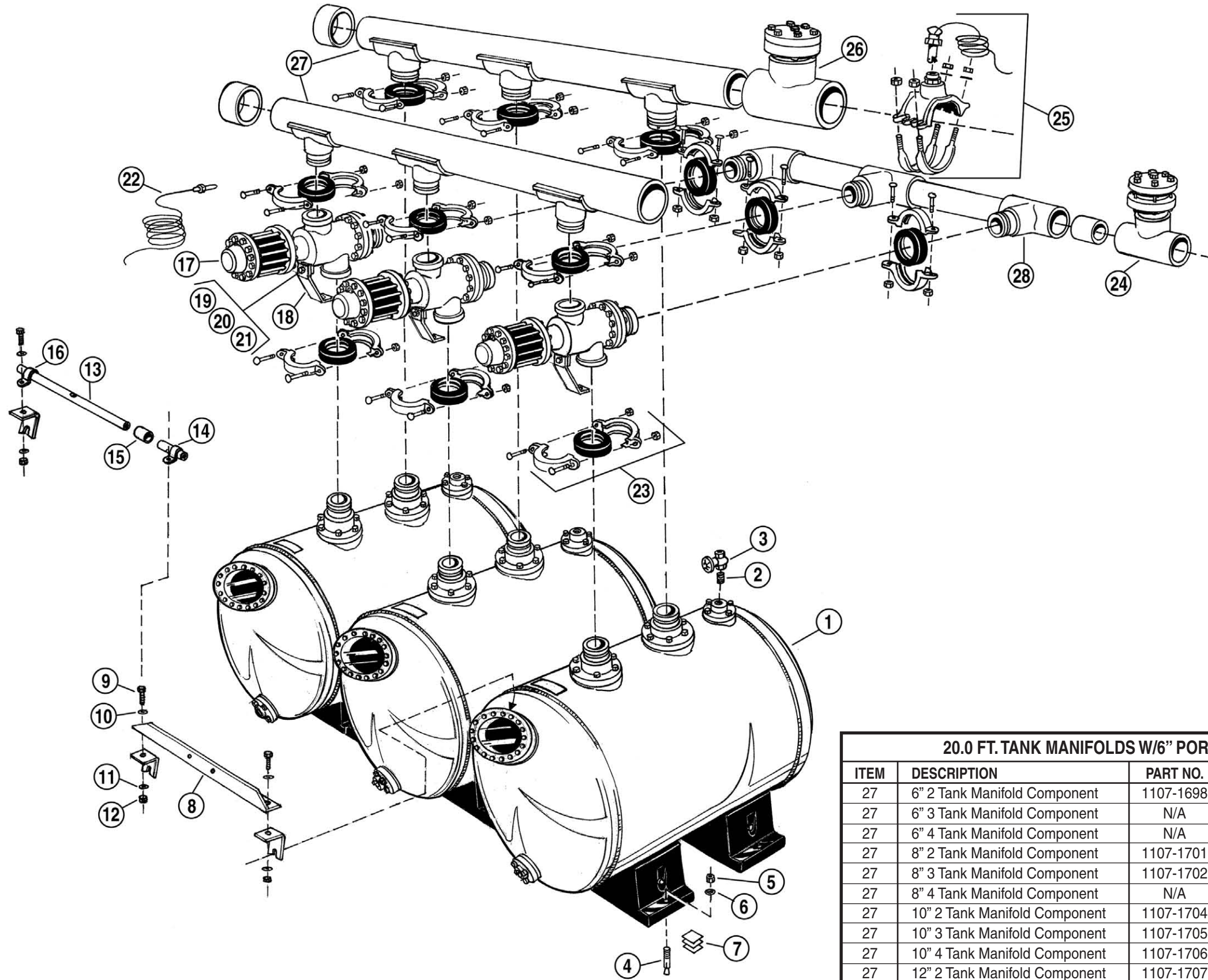


**16.5 FT² STEEL
INTERNAL PARTS – PARTS LIST**

16.5 FT ² STEEL – INTERNAL PARTS			
ITEM	DESCRIPTION	QUANTITY	PART NO.
1	3/8-16 x 2 3/4" Hex Bolt SS	330-1233	15
2	3/8" Flat Washer	327-1003	30
3	3/8-16 UNC Hex Nut SS	321-1003	15
4	1/2-13 UNC Hex Nut SS	321-1011	2
5	1/2" Flatwasher SS	327-1014	2
6	Clear Manhole Cover	344-1243	1
7	Manhole O-Ring Gasket	308-1223	1
8	1/2-13 x 4" Stud SS	376-1074	1
9	1/4-20 x 3/4" Hex Head Bolt	324-1016	4
10	1/4" Flatwasher SS	327-1011	4
11	1/4" Lockwasher SS	326-1012	4
12	Dist Zee Bracket	385-1427	1
13	1/4-20 x 1/4" Set Screw SS	330-1038	2
14	16.5 Steel Tank Bracket	385-1461	1
15	5/8-11 x 2 1/2" Hex Head Bolt	330-1284	1
16	Influent Riser	1107-1670	1
17	5/8-11 x 2" Hex Head Bolt	324-1049	23
18	5/8" Flat Washer	327-1069	24
19	Effluent Riser	1107-1675	1
20	4" Flange Gasket	308-1183	2
21	2" Flange Gasket	308-1111	1
22	2" Air Relief Flange	1107-1674	1
23	Flanged 16.5 Steel Tank	385-1432	1
24	Wall O-Ring	308-1026	1
25	3/8" x 1/4" NPT Male Connector	343-1055	1
26	3/8" Seal Tubing 36" Long	341-1112	1
27	6-1/2" Hose Clamp	387-1236	1
28	1/4" NPT Plug	343-1212	1
29	Hex Pipe Nipple	343-1052	1
30	Suction Screen Strainer	343-1213	1
31	3/8" Tube x 1/4" NPT Fem. Connct.	343-1056	1
32	3/4" Tank Drain Plug	343-1345	1
33	2" Drain Flange	1107-1678	1
34	Media Screen Gasket	348-1051	1
35	Distribution Manifold Assy.- Long	1107-1610	2
36	Manifold Support Bracket	1104-1117	1
37	Distribution Collector Header	340-2164	1
38	#14 x 1 1/2" Flat Head Screw	330-1212	4
39	Distribution Manifold Assy.-Short	1107-1611	2
40	Distribution Collection Manifold	340-2166	1
41	1" Pipe Plug	343-1200	2
42	Lateral - 12" Long	1116-1226	24
43	Manifold Support Leg	340-2167	2

20 FT² STEEL TANK SYSTEM – EXPLODED VIEW

20 FT² STEEL TANK SYSTEM – PARTS LIST

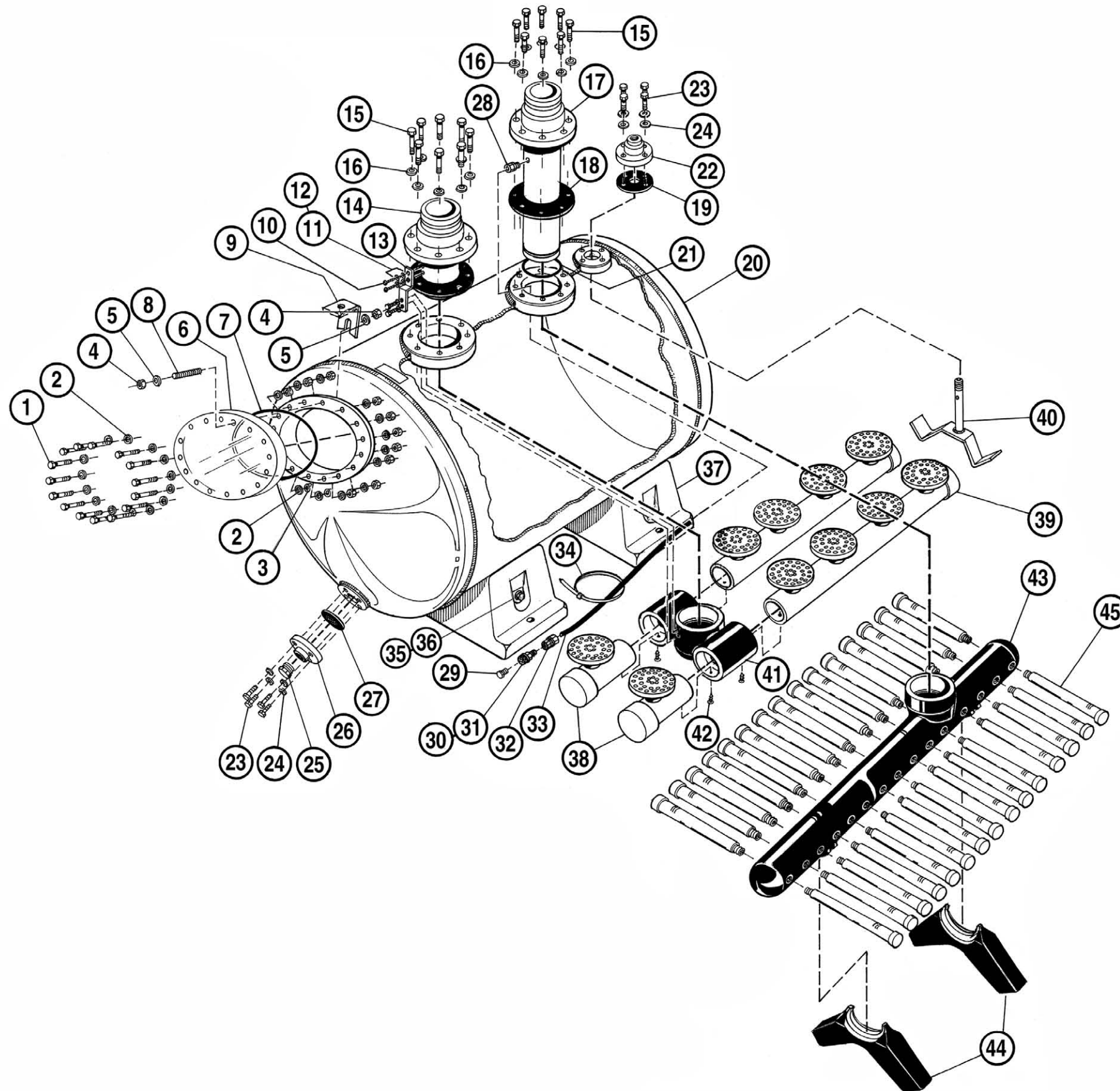


20 FT ² STEEL TANK SYSTEM			
ITEM	DESCRIPTION	PART NO.	QUANTITY
1	20.0 Poly lined Steel Tank	2-0010-024	1
2	3/4" Close Pipe Nipple	343-1040	1
3	3/4" Compression Stop	393-1013	1
4	3/4" Anchor	332-1137	4
5	3/4"-10 - 6" Bolt	330-1247	4
6	3/4" Flat Washer	332-1010	4
7	Tank Shim	385-1183	16
8	Filter Control Mounting Bracket	2-0020-181	1
9	1/2" x 1 1/2" Hex Bolt	330-1150	2
10	1/2" Lock Washer	326-1014	2
11	1/2" Flat Washer	326-1013	4
12	1/2" Hex Nut	320-1012	2
13	Tubing Conduit Section – 45"	344-1024	1
14	Tubing Conduit Extension – 4-1/2"	344-1022	1
15	1-1/4" PVC Coupling	343-1352	1
16	Conduit Clamp	387-1008	2
17	4" Backwash Valve	2-0020-171	1
17	6" Backwash Valve	2-0020-225	1
18	Backwash Valve Support Brkt.	385-1471	1
19	3/8-16 x 1 1/2 Hex Head Bolt	324-1004	1
20	3/8" Washer	327-1003	2
21	3/8-16 Hex Head Nut	320-1013	1
22	10' Temperature Probe	303-2087	1
23	6" Steel Coupling Set w/ Hardware	384-1010	1
24	4" Backwash Sight Glass Valve	2-0020-179	1
24	6" Backwash Sight Glass Valve	2-0020-226	1
25	6" Flow Sensor Kit	2-0020-213	1
25	8" Flow Sensor Kit	2-0020-211	1
25	10" Flow Sensor Kit	2-0020-214	1
25	12" Flow Sensor Kit	2-0020-215	1
26	6" Priority Valve	2-0020-174	1
26	8" Effluent Valve	2-0020-121	1
26	10" Effluent Valve	2-0020-122	1
26	12" Effluent Valve	2-0020-xxx	1

20.0 FT. TANK MANIFOLDS W/6" PORTS				20.0 FT. TANK MANIFOLDS W/4" PORTS		
ITEM	DESCRIPTION	PART NO.	QUANTITY	DESCRIPTION	PART NO.	QUANTITY
27	6" 2 Tank Manifold Component	1107-1698	1	6" 2 Tank Manifold Component	1107-1711	1
27	6" 3 Tank Manifold Component	N/A	1	6" 3 Tank Manifold Component	N/A	1
27	6" 4 Tank Manifold Component	N/A	1	6" 4 Tank Manifold Component	N/A	1
27	8" 2 Tank Manifold Component	1107-1701	1	8" 2 Tank Manifold Component	N/A	1
27	8" 3 Tank Manifold Component	1107-1702	1	8" 3 Tank Manifold Component	1107-1715	1
27	8" 4 Tank Manifold Component	N/A	1	8" 4 Tank Manifold Component	1107-1716	1
27	10" 2 Tank Manifold Component	1107-1704	1	10" 2 Tank Manifold Component	1107-1717	1
27	10" 3 Tank Manifold Component	1107-1705	1	10" 3 Tank Manifold Component	1107-1718	1
27	10" 4 Tank Manifold Component	1107-1706	1	10" 4 Tank Manifold Component	N/A	1
27	12" 2 Tank Manifold Component	1107-1707	1	12" 2 Tank Manifold Component	N/A	1
27	12" 3 Tank Manifold Component	1107-1708	1	12" 3 Tank Manifold Component	N/A	1
27	12" 4 Tank Manifold Component	1107-1709	1	12" 4 Tank Manifold Component	N/A	1
28	6" Waste Manifold w/ 6" Ports	1107-1616	1	6" Waste Manifold w/ 4" Ports	1107-1622	1

**20 FT² STEEL
INTERNAL PARTS – EXPLODED VIEW**

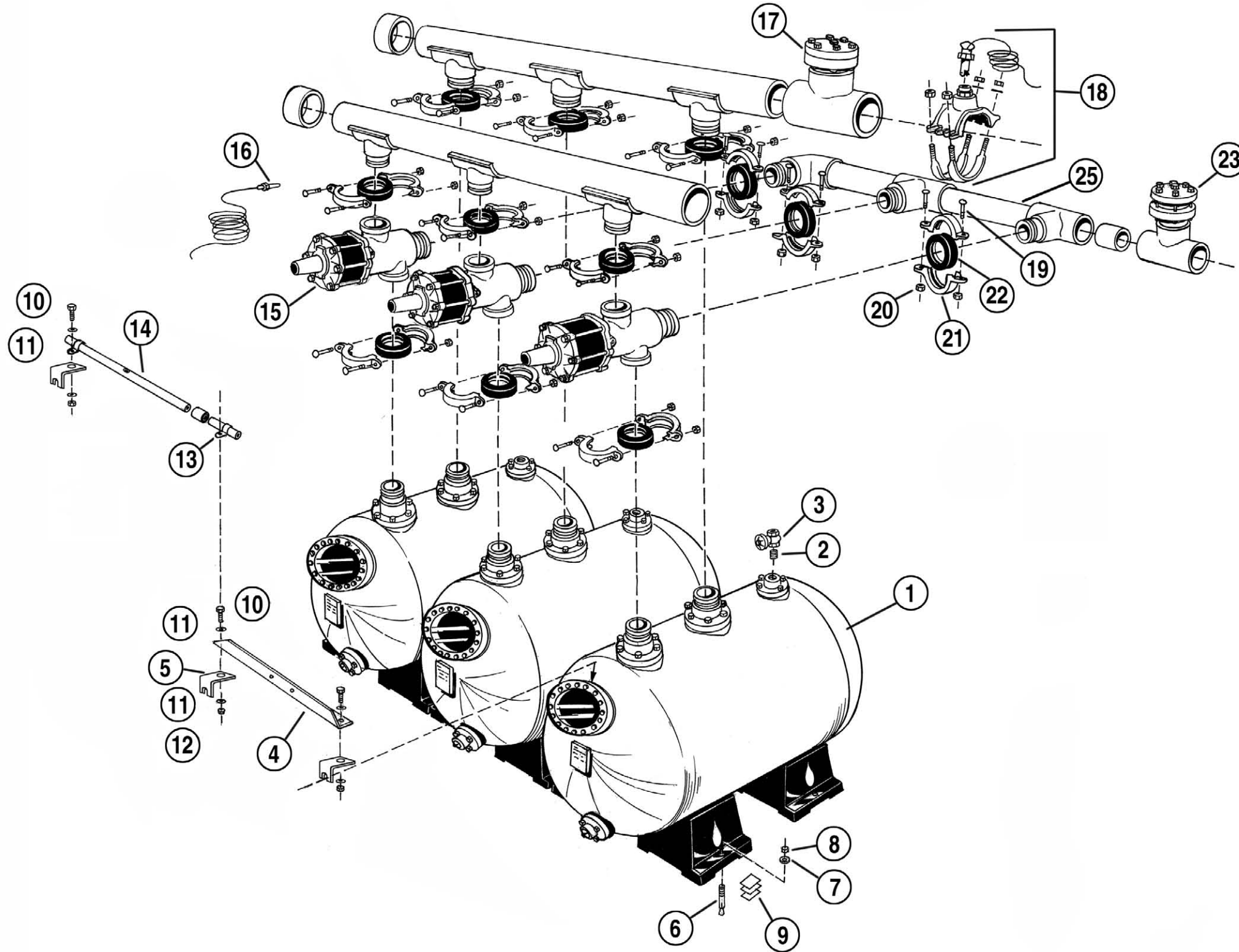
**20 FT² STEEL
INTERNAL PARTS – PARTS LIST**



20 FT ² STEEL – INTERNAL PARTS			
ITEM	DESCRIPTION	QUANTITY	PART NO.
1	3/8-16 x 2 3/4" Hex Bolt SS	330-1233	15
2	3/8" Flat Washer	327-1003	30
3	3/8-16 UNC Hex Nut SS	321-1003	15
4	1/2-13 UNC Hex Nut SS	321-1011	2
5	1/2" Flatwasher SS	327-1014	2
6	Clear Manhole Cover	344-1243	1
7	Manhole O-Ring Gasket	308-1223	1
8	1/2-13 x 4" Stud SS	376-1074	1
9	Controller Mounting Bracket	385-1470	1
10	1/4-20 x 3/4" Hex Head Bolt	324-1016	4
11	1/4" Lockwasher SS	326-1012	4
12	1/4" Flatwasher SS	327-1011	4
13	Dist Zee Bracket	385-1427	1
14	Influent Riser	1107-1694	1
15	3/4-10 x 2 1/2" Hex Head Bolt	330-1123	16
16	Flat Washer - 3/4 SS	327-1039	16
17	Effluent Riser	1107-1695	1
18	6" Flange Gasket	308-1184	2
19	2" Flange Gasket	308-1111	1
20	42" x 57" Steel Tank	385-1441	1
21	Wall O-Ring 6.140 x .275	308-1275	1
22	2" Air Relief Flange Assy.	1107-1674	1
23	5/8-11 x 2" Hex Head Bolt	324-1049	8
24	Flat Washer	327-1069	8
25	3/4" Tank Drain Plug	343-1345	1
26	2" Drain Flange	1107-1678	1
26	Media Screen Gasket	348-1051	1
28	3/8" x 1/4" NPT Male Connector	343-1055	1
29	1/4" NPT Plug	343-1212	1
30	Suction Screen Strainer	343-1213	1
31	Hex Pipe Nipple	343-1052	1
32	3/8" Tube x 1/4" NPT Fem. Connct.	343-1056	1
33	3/8" Seal Tubing 36" Long	341-1112	1
34	Cable Tie - 28" long	303-1680	1
35	Bolt - 3/4-10x4" Hex Head	330-1188	4
36	Washer - 3/4"	326-1010	4
37	Tank Base	340-2363	2
38	Distribution Manifold Assy. – Short	1107-1692	2
39	Distribution Manifold Assy.- Long	1107-1693	2
40	Manifold Support Bracket	1104-1119	1
41	Distribution Collector Header	340-2360	1
42	#14 x 1 1/2" Flat Head Screw	330-1212	4
43	Collection Manifold	340-2359	1
44	Manifold Support Leg	340-2261	2
45	Lateral - 12" Long	1116-1226	30

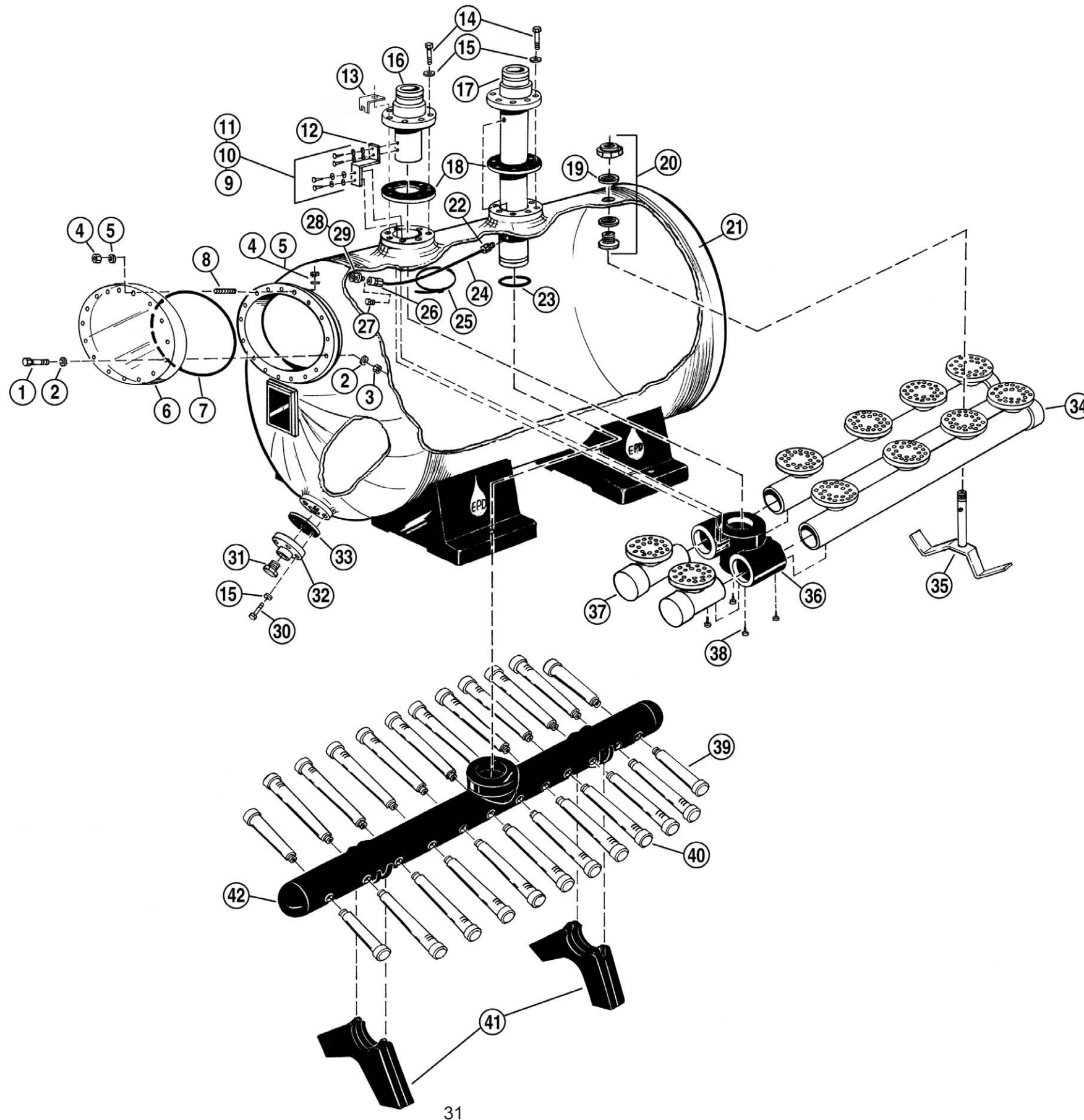
**COMPOSITE TANK SYSTEM
EXPLODED VIEW AND PARTS LIST**

COMPOSITE TANK SYSTEM – PARTS LIST



COMPOSITE TANK SYSTEM			
ITEM	DESCRIPTION	QUANTITY	PART NO.
1	16.5 Composite Tank	2-0010-019	1
2	3/4" Nipple	343-1040	1
3	3/4" Valve	393-1013	1
4	Filter Control Mounting Bracket	2-0020-181	1
5	Composite Tank Bracket	385-1341	1
6	3/4" Anchor	332-1137	4
7	3/4" Flat Washer	332-1010	4
8	3/4"-10 - 6" Bolt	330-1247	4
9	Tank Shim	385-1183	16
10	1/2" x 1 1/2" Hex Bolt	330-1150	1
11	1/2" Lock Washer	326-1014	1
12	1/2" Nut	320-1012	1
13	Conduit Clamp	387-1008	1
14	41" Tubing Conduit	344-1031	1
15	4" - 3 Way, Hydraulic BW Valve	2-0020-171	1
16	10' Temperature Probe	303-2087	1
17	4" Priority Valve	2-0020-173	1
17	6" Priority Valve	2-0020-174	1
17	8" Effluent Valve	2-0020-121	1
17	10" Effluent Valve	2-0020-122	1
17	12" Effluent Valve	2-0020-140	1
18	4" Flow Sensor Kit	2-0020-212	1
18	6" Flow Sensor Kit	2-0020-213	1
18	8" Flow Sensor Kit	2-0020-211	1
18	10" Flow Sensor Kit	2-0020-214	1
18	12" Flow Sensor Kit	2-0020-215	1
19	7/16" x 3" Carriage Bolt	324-1047	6
20	7/16" Nut	321-1044	6
21	4" Grooved Coupling Half	340-2313	6
22	4" Grooved Coupling Seal	308-1050	3
23	4" Backwash Sight Glass Valve	2-0020-179	1
24	4" 2 Tank Manifold	1107-1185	1
24	6" 2 Tank Manifold	1107-1188	1
24	6" 3 Tank Manifold	1107-1203	1
24	8" 4 Tank Manifold	1107-1215	1
24	8" 5 Tank Manifold	1107-1218	1
24	10" 5 Tank Manifold	1107-1507	1
24	10" 6 Tank Manifold	1107-1194	1
24	10" 7 Tank Manifold	1107-1200	1
24	10" 8 Tank Manifold	1107-1286	1
25	4" 2 Tank Waste Manifold	1107-1615	1
25	4" 3 Tank Waste Manifold	1107-1150	1
25	4" 4 Tank Waste Manifold	1107-1153	1
25	4" 5 Tank Waste Manifold	1107-1156	1
25	4" 6 Tank Waste Manifold	1107-1159	1
25	4" 7 Tank Waste Manifold	1107-1162	1
25	4" 8 Tank Waste Manifold	1107-1289	1

**COMPOSITE TANK
INTERNAL PARTS – EXPLODED VIEW**



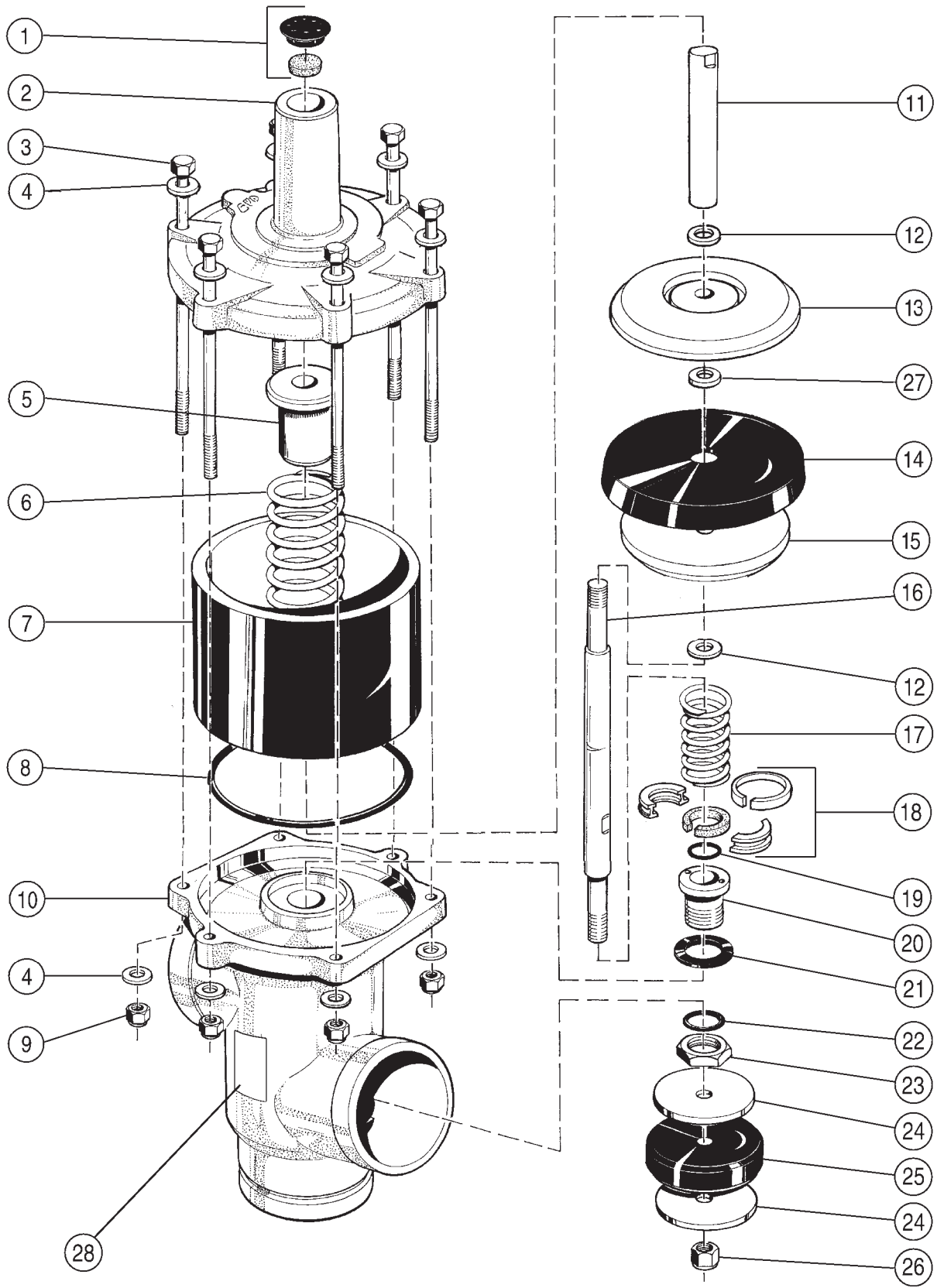
**COMPOSITE TANK
INTERNAL PARTS – PARTS LIST**

COMPOSITE TANK – INTERNAL PARTS			
ITEM	DESCRIPTION	QUANTITY	PART NO.
1	3/8-16 x 2 3/4" Hex Bolt SS	330-1233	15
2	3/8" Flat Washer	327-1003	30
3	3/8-16 UNC Hex Nut SS	321-1003	15
4	1/2-13 UNC Hex Nut SS	321-1011	2
5	1/2" Flatwasher SS	327-1014	2
6	Clear Manhole Cover	344-1243	1
7	Manhole O-Ring Gasket	308-1223	1
8	1/2-13 x 4" Stud SS	376-1074	1
9	1/4-20 x 3/4" Hex Head Bolt	324-1016	4
10	1/4" Flatwasher SS	327-1011	4
11	1/4" Lockwasher SS	326-1012	4
12	Dist Zee Bracket	385-1427	1
13	Control Mounting Brkt Support	385-1341	1
14	5/8-11 x 2 1/2" Hex Head Bolt	330-1284	16
15	5/8" Flat Washer	327-1069	20
16	Influent Riser	1107-1670	1
17	Effluent Riser	1107-1669	1
18	4" Flange Gasket	308-1183	2
19	3/4" Bulkhead Washer	344-1241	1
20	3/4" Bulkhead Fitting Assy	343-1332	1
21	Composite Tank	1107-1661	1
22	3/8" x 1/4" NPT Male Connector	343-1055	1
23	Wall O-Ring	308-1026	1
24	3/8" Seal Tubing 36" Long	341-1112	1
25	6-1/2" Hose Clamp	387-1236	1
26	3/8" Tube x 1/4" NPT Fem. Connct.	343-1056	1
26	1/4" NPT Plug	343-1212	1
28	Suction Screen Strainer	343-1213	1
29	Hex Pipe Nipple	343-1052	1
30	5/8-11 x 2" Hex Head Bolt	324-1049	4
31	3/4" Tank Drain Plug	343-1345	1
32	2" Drain Flange	1107-1678	1
33	Media Screen Gasket	348-1051	1
34	Distribution Manifold Assy.- Long	1107-1671	2
35	Manifold Support Bracket	1104-1116	1
36	Distribution Collector Header	340-2164	1
37	Distribution Manifold Assy.- Short	1107-1611	2
38	#14 x 1 1/2" Flat Head Screw	330-1212	4
39	Lateral - 7 3/4" Long	1107-1460	4
40	Lateral - 12" Long	1116-1226	20
41	Manifold Support Leg	340-2167	2
42	Collection Manifold	340-2358	1

BACKWASH VALVE ASSEMBLY – EXPLODED VIEW

ASSEMBLY NO. 1225-1045

FINISHED GOODS P/N 2-0020-171



BACKWASH VALVE ASSEMBLY – PARTS LIST

ASSEMBLY NO. 1225-1045

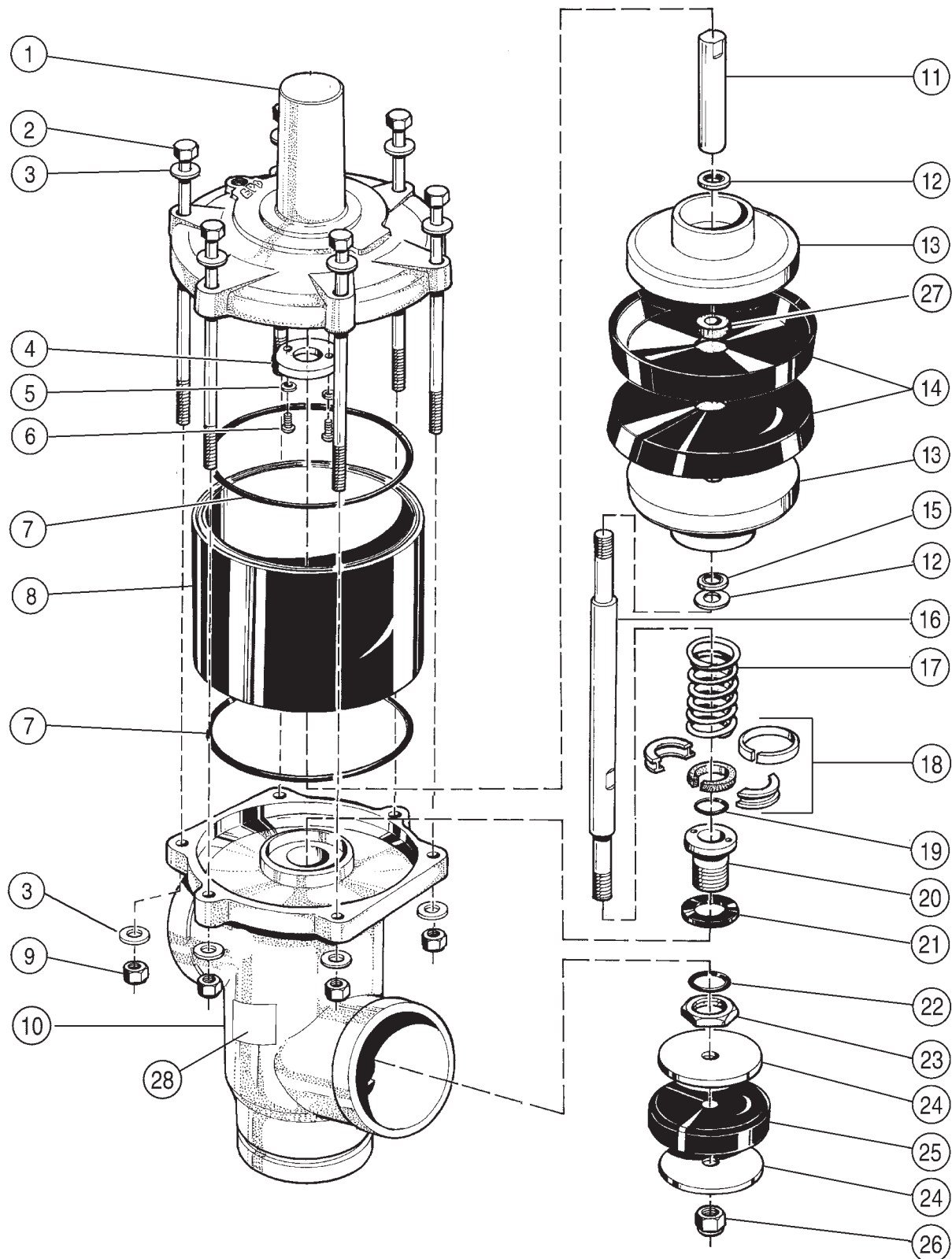
FINISHED GOODS P/N 2-0020-171

BACKWASH VALVE - LIST OF PARTS			
ITEM	DESCRIPTION	QUANTITY	PART NO.
1	VENT PLUG ASSEMBLY	1	1119-1037
2	CYLINDER COVER	1	384-1003
3	3/8-16 X 7 1/2" LONG BOLT	6	324-1040
4	3/8" FLAT WASHER	12	326-1016
5	EXTENSION GUIDE BUSHING	1	344-1014
6	SPRING	1	396-1004
7	VALVE CYLINDER	1	344-1162
8	O-RING	1	308-1027
9	3/8"-16 ELASTIC LOCKNUT	6	321-1037
10	4" BACKWASH VALVE BODY	1	384-1012
11	SHAFT EXTENSION	1	376-1008
12	RETAINER LOAD WASHER	2	327-1018
13	EXTERNAL RETAINER	1	344-1101
14	CUP SEAL – 5-7/8" W/1" CENTER HOLE	1	348-1040
15	INTERNAL RETAINER	1	344-1100
16	VALVE SHAFT	1	376-1017
17	WIPER SPRING	1	396-1005
18	WIPER ASSEMBLY	1	1121-1135
19	QUAD SEAL	1	308-1023
20	SHAFT SEAL BUSHING	1	344-1091
21	GASKET	1	307-1020
22	O-RING	1	308-1002
23	RETAINER NUT	1	340-1007
24	RETAINER DISC	2	385-1050
25	DISC SEAL	1	348-1020
26	1/2" ELASTIC LOCKNUT	1	321-1015
27	CUP SEAL SPACER	1	376-1069
28	BACKWASH VALVE PORT LABEL	1	360-1167

REVERSE FLOW BACKWASH VALVE EXPLODED VIEW

ASSEMBLY NO. 1225-1062

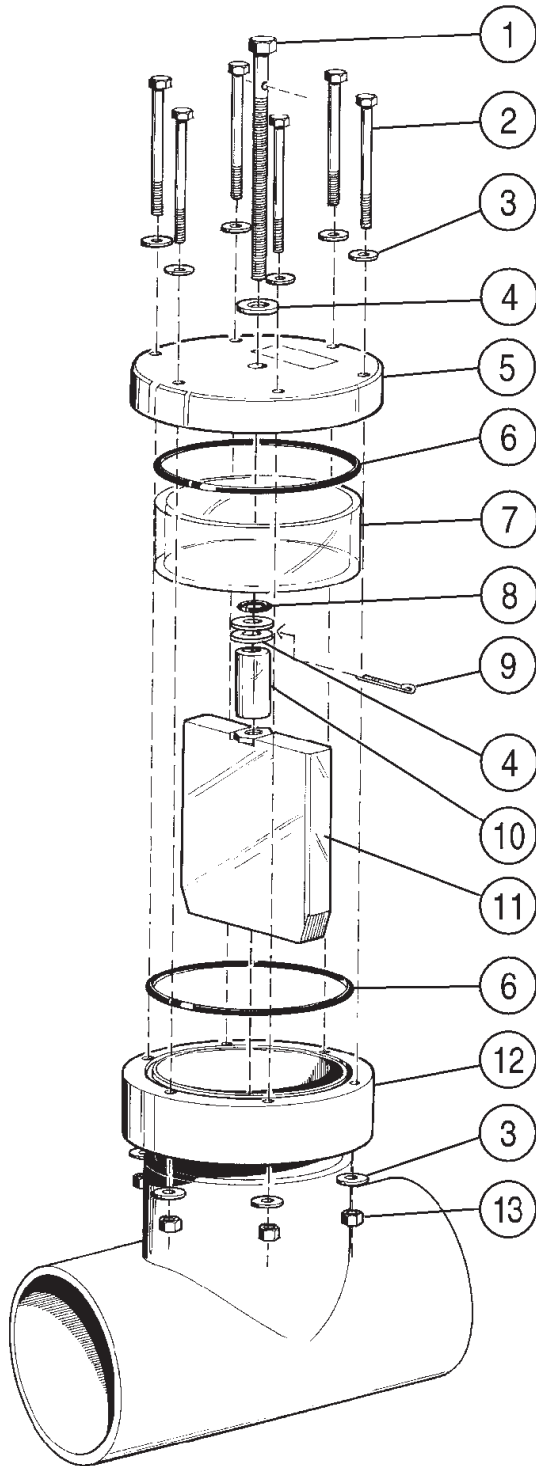
FINISHED GOODS P/N 2-0020-204



**REVERSE FLOW BACKWASH VALVE
PARTS LIST**
ASSEMBLY NO. 1225-1062
FINISHED GOODS P/N 2-0020-204

REVERSE FLOW BACKWASH VALVE			
ITEM	DESCRIPTION	QUANTITY	PART NO.
1	CYLINDER COVER	1	1104-1106
2	3/8-16 X 6 1/2" LONG BOLT	6	330-1250
3	3/8" FLAT WASHER	12	326-1016
4	GUIDE WASHER	1	344-1219
5	#10 LOCK WASHER	2	327-1058
6	#10-24 X 3/4" SCREW	2	330-1207
7	O-RING	2	308-1027
8	VALVE CYLINDER-DUAL CUP	1	344-1299
9	3/8" ELASTIC LOCKNUT	6	321-1037
10	4" BACKWASH VALVE BODY	1	384-1014
11	SHAFT EXTENSION	1	376-1061
12	RETAINER LOAD WASHER	2	327-1018
13	INTERNAL RETAINER	2	344-1100
14	CUP SEAL	2	348-1040
15	1/2" SEAL WASHER	1	308-1189
16	VALVE SHAFT	1	376-1017
17	WIPER SPRING	1	396-1005
18	WIPER ASSEMBLY	1	1121-1135
19	QUAD SEAL	1	308-1023
20	SHAFT SEAL BUSHING	1	344-1091
21	GASKET	1	307-1020
22	O-RING	1	308-1002
23	RETAINER NUT	1	340-1007
24	RETAINER DISC	2	385-1050-1
25	DISC SEAL	1	348-1020
26	1/2" ELASTIC LOCKNUT	1	321-1015
27	CUP SEAL SPACER	1	344-1361
28	BACKWASH VALVE PORT LABEL	1	360-1167

BACKWASH SIGHT GLASS VALVE
ASSEMBLY NO.1225-1063
FINISHED GOODS P/N 2-0020-179



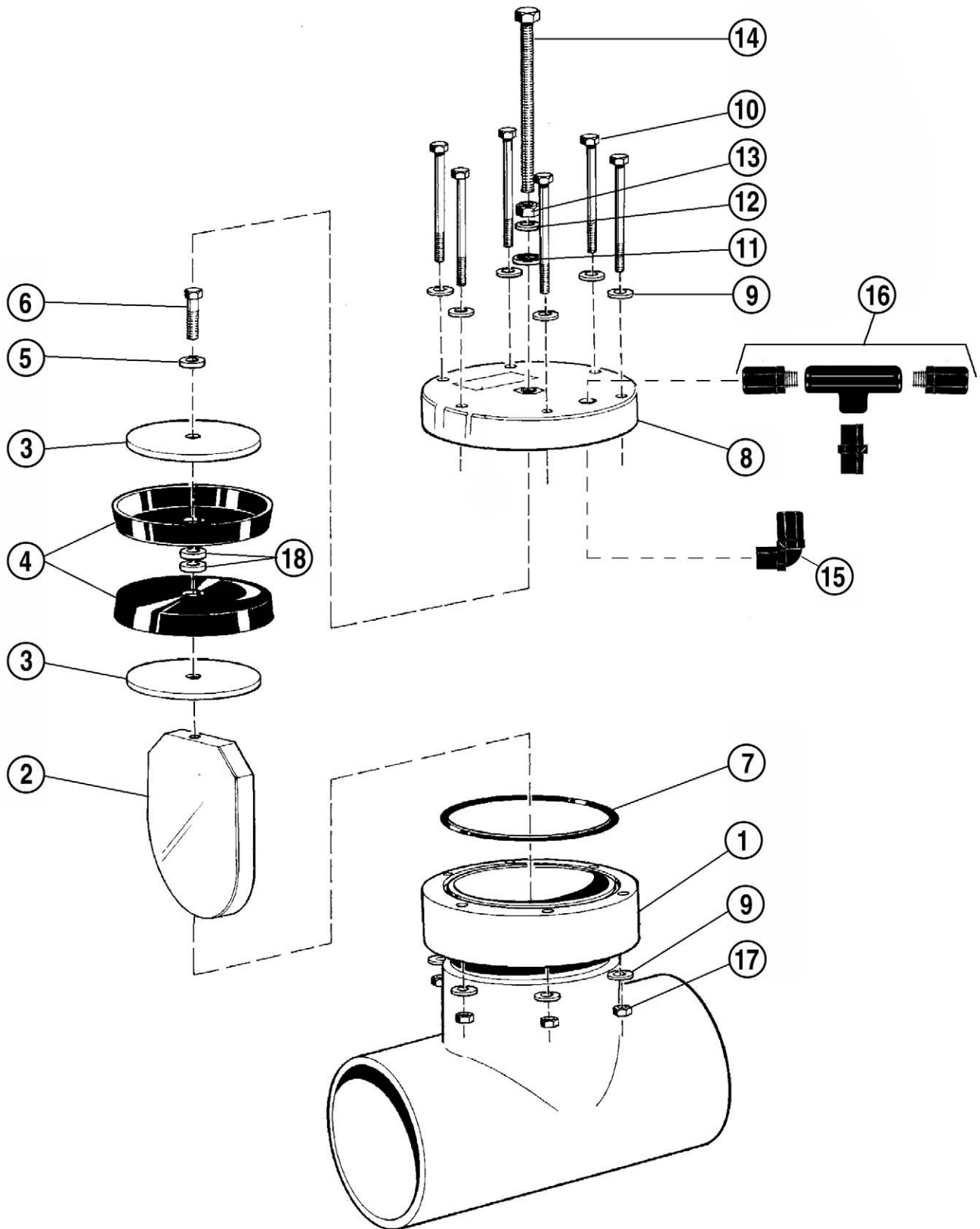
4" BACKWASH SIGHT GLASS VALVE			
ITEM	DESCRIPTION	QTY	PART NO.
1	Drive Bolt	1	376-1065
2	Flange Bolt	6	330-1210
3	Washer	12	426-1000
4	Washer	3	327-1003
5	Cover	1	344-1207
6	O-Ring	2	308-1098
7	Sight Tube	1	344-1216
8	O-Ring	1	308-1070
9	Cotter Pin	1	332-1048
10	Spacer	1	344-1218
11	Gate	1	1107-1419
12	Body	1	1107-1415
13	Nut	6	321-1035

PRIORITY VALVE — EXPLODED VIEW

4" FINISHED GOODS P/N 2-0020-173

6" FINISHED GOODS P/N 2-0020-174

8" FINISHED GOODS P/N 2-0020-139



PRIORITY VALVE — PARTS LIST

4" FINISHED GOODS P/N 2-0020-173

6" FINISHED GOODS P/N 2-0020-174

8" FINISHED GOODS P/N 2-0020-139

PRIORITY VALVE ASSEMBLY - LIST OF PARTS							
ITEM	DESCRIPTION	4" VALVE		6" VALVE		8" VALVE	
		QTY	PART NO.	QTY	PART NO.	QTY	PART NO.
1	Valve Body Assembly	1	1107-1417	1	1225-1004	1	1107-1525
2	Gate	1	344-1320	1	344-1318	1	344-1279
3	Cup Seal Retainer	2	344-1319	2	344-1317	2	344-1308
4	Cup Seal	2	308-1247	2	308-1248	2	308-1245
5	Washer	1	327-1003	1	327-1003	1	327-1003
6	Bolt	1	330-1231	1	330-1231	1	330-1233
7	O-Ring	1	308-1098	1	308-1027	1	308-1192
8	Cover Assembly	1	1107-1556	1	1107-1557	1	1107-1561
9	Washer	12	426-1000	16	326-1019	24	326-1019
10	Bolt	6	330-1252	8	324-1043	12	330-1254
11	Thread Seal	1	308-1032	1	308-1032	1	308-1032
12	Counter Sunk Washer	1	385-1070	1	385-1070	1	385-1070
13	Nut	1	320-1013	1	320-1013	1	320-1013
14	Bolt	1	324-1034	1	324-1034	1	324-1034
15	3/8" Tube x 1/4 NPT Male Elbow	1	343-1050	1	343-1050	1	343-1050
16	Tee Assembly – Manual Priority Valve	1	1107-1374	1	1107-1374	1	1107-1374
17	Elastic Locknut	6	321-1035	8	321-1042	12	321-1042
18	Cup Seal Spacer	2	376-1082	2	376-1080	1	376-1080

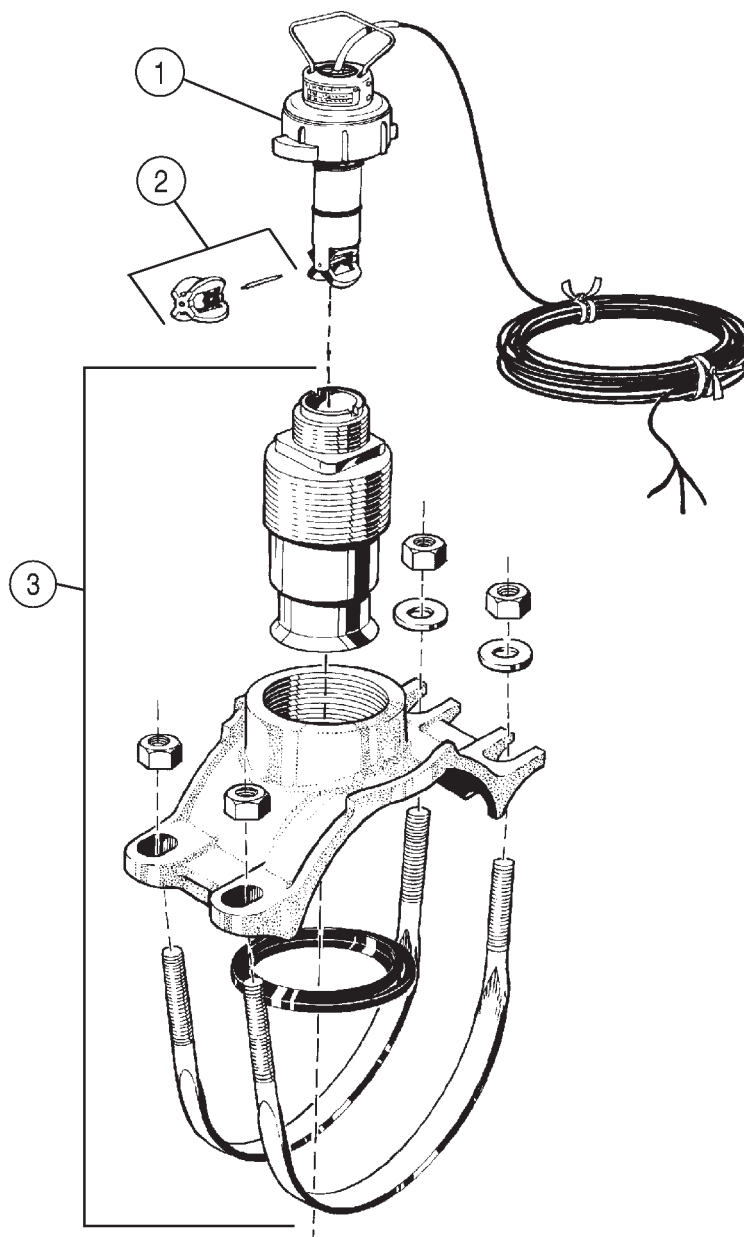
FLOW SENSOR AND SADDLE

4" ASSEMBLY NO. 2-0020-212

6" ASSEMBLY NO. 2-0020-213

8" ASSEMBLY NO. 2-0020-211

10" ASSEMBLY NO. 2-0020-214

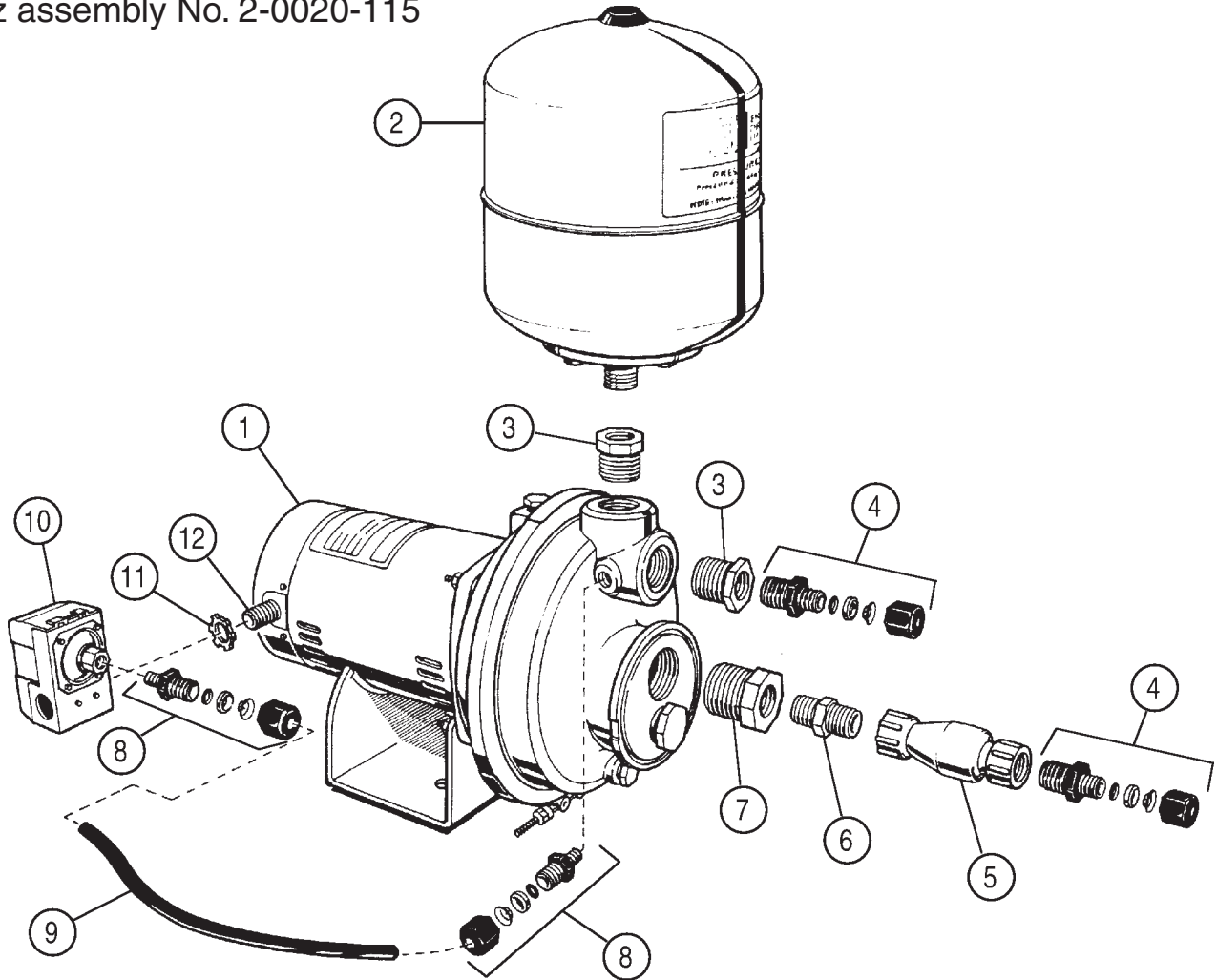


FLOW METER SADDLE AND SENSOR ASSEMBLY						
ITEM	DESCRIPTION	QTY.	FLOW METER SADDLE/SENSOR SIZE			
			4"	6"	8"	10"
1	FLOW SENSOR ASSEMBLY	1	303-2057	303-2058	303-2058	303-2059
2	REPLACEMENT PADDLE/PIN KIT	1	1121-1399	1121-1399	1121-1399	1121-1399
3	FLOW SENSOR SADDLE	1	343-1150	343-1151	343-1152	343-1153

Pressure Amplification System

60 Hz assembly No. 2-0020-076

50 Hz assembly No. 2-0020-115



PRESSURE AMPLIFICATION SYSTEM			
ITEM	DESCRIPTION	QUANTITY	PART NO.
1	Booster Pump - 1/2 HP, 115 VAC, 60 Hz	1	1250-1097-440
	Booster Pump - 1/2 HP, 230 VAC, 50 Hz	1	1250-1102-440
2	Tank-Pump/Hydro Pneumatic	1	395-1017
3	1" NPT x 3/4" FPT Bushing	2	343-1193
4	3/8" Tube x 3/4" NPT Male Connector	2	343-1122
5	Check Valve - 3/4" PVC	1	393-1039
6	3/4" Hex Pipe Nipple	6	343-1177
7	1 1/4" MPT x 3/4" FPT Bushing	1	343-1205
8	1/4" MPT x 3/8" Tube Fitting	2	343-1055
9	3/8" Dia. x 15" Poly Tubing	1	341-1230
10	Pressure Switch	1	303-1343
11	1/2" Conduit Locknut	1	343-1194
12	1/2" x Close Galvanized Nipple	1	343-1195

ATTACHMENT F
RESERVED

ATTACHMENT G
CONTRACT AGREEMENT

CONTRACT AGREEMENT

CONSTRUCTION CONTRACT

This contract is made and entered into between THE CITY OF SAN DIEGO, a municipal corporation, herein called "City", and Marcon Engineering, Inc., herein called "Contractor" for construction of **Balboa Park Bud Kearns Aquatic Complex Improvements**; Bid No.**K-20-1815-DBB-3-A**; in the amount of Two Million Two Hundred Forty Eight Thousand Eight Hundred Eighty Eight Dollars and Zero cents (\$2,248,888.00) which is comprised of the Base Bid.

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

1. The following are incorporated into this contract as though fully set forth herein:
 - (a) The attached Faithful Performance and Payment Bonds.
 - (b) The attached Proposal included in the Bid documents by the Contractor.
 - (c) Reference Standards listed in the Instruction to Bidders and the Supplementary Special Provisions (SSP).
 - (d) That certain documents entitled **Balboa Park Bud Kearns Aquatic Complex Improvements**, on file in the office of the Public Works Department as Document No. **S-17000**, 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 **Balboa Park Bud Kearns Aquatic Complex Improvements**, Bid Number **K-20-1815-DBB-3-A**, San Diego, California.
3. For such performances, the City shall pay to Contractor the amounts set forth at the times and in the manner and with such additions or deductions as are provided for in this contract, and the Contractor shall accept such payment in full satisfaction of all claims incident to such performances.
4. No claim or suit whatsoever shall be made or brought by Contractor against any officer, agent, or employee of the City for or on account of anything done or omitted to be done in connection with this contract, nor shall any such officer, agent, or employee be liable hereunder.
5. This contract is effective as of the date that the Mayor or designee signs the agreement.

CONTRACT AGREEMENT (continued)

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

THE CITY OF SAN DIEGO

APPROVED AS TO FORM

Mara W. Elliott, City Attorney

By _____

By _____

Print Name: Stephen Samara
Principal Contract Specialist
Public Works Department

Print Name: _____
Deputy City Attorney

Date: _____

Date: _____

CONTRACTOR

By  _____

Print Name: Maryory Contreras

Title: President

Date: 03-03-2020

City of San Diego License No.: B2013060627

State Contractor's License No.: 631811

DEPARTMENT OF INDUSTRIAL RELATIONS (DIR) REGISTRATION NUMBER: 1000029618

CONTRACT AGREEMENT

CONSTRUCTION CONTRACT

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

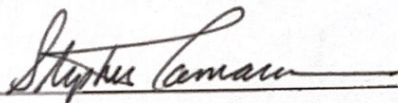
1. The following are incorporated into this contract as though fully set forth herein:
 - (a) The attached Faithful Performance and Payment Bonds.
 - (b) The attached Proposal included in the Bid documents by the Contractor.
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5. This contract is effective as of the date that the Mayor or designee signs the agreement.

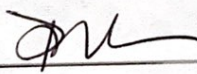
CONTRACT AGREEMENT (continued)

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 

Mara W. Elliott, City Attorney
By 

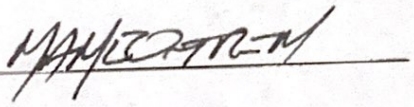
Print Name: Stephen Samara
Principal Contract Specialist
Public Works Department

Print Name: Bonny Hsu
Deputy City Attorney

Date: 4/28/2020

Date: 4/29/20

CONTRACTOR

By 

Print Name: Maryory Contreras

Title: President

Date: 03-03-2020

City of San Diego License No.: B2013060627

State Contractor's License No.: 631811

DEPARTMENT OF INDUSTRIAL RELATIONS (DIR) REGISTRATION NUMBER: 1000029618

CERTIFICATIONS AND FORMS

The Bidder, by submitting its electronic bid, agrees to and certifies under penalty of perjury under the laws of the State of California, that the certifications, forms and affidavits submitted as part of this bid are true and correct.

BIDDER'S GENERAL INFORMATION

To the City of San Diego:

Pursuant to "Notice Inviting Bids", specifications, and requirements on file with the City Clerk, and subject to all provisions of the Charter and Ordinances of the City of San Diego and applicable laws and regulations of the United States and the State of California, the undersigned hereby proposes to furnish to the City of San Diego, complete at the prices stated herein, the items or services hereinafter mentioned. The undersigned further warrants that this bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

The undersigned bidder(s) further warrants that bidder(s) has thoroughly examined and understands the entire Contract Documents (plans and specifications) and the Bidding Documents therefore, and that by submitting said Bidding Documents as its bid proposal, bidder(s) acknowledges and is bound by the entire Contract Documents, including any addenda issued thereto, as such Contract Documents incorporated by reference in the Bidding Documents.

**NON-COLLUSION AFFIDAVIT TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID UNDER 23
UNITED STATES CODE 112 AND PUBLIC CONTRACT CODE 7106**

State of California

County of San Diego

The bidder, being first duly sworn, deposes and says that he or she is authorized by the party making the foregoing bid that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

CONTRACTOR CERTIFICATION

DRUG-FREE WORKPLACE

I hereby certify that I am familiar with the requirements of San Diego City Council Policy No. 100-17 regarding Drug-Free Workplace as outlined in the WHITEBOOK, Section 5-1.3, "Drug-Free Workplace", of the project specifications, and that;

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

CONTRACTOR CERTIFICATION

AMERICANS WITH DISABILITIES ACT (ADA) COMPLIANCE CERTIFICATION

I hereby certify that I am familiar with the requirements of San Diego City Council Policy No. 100-4 regarding the Americans With Disabilities Act (ADA) outlined in the WHITEBOOK, Section 5-1.2, "California Building Code, California Code of Regulations Title 24 and Americans with Disabilities Act", of the project specifications, and that:

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

CONTRACTOR CERTIFICATION

CONTRACTOR STANDARDS – PLEDGE OF COMPLIANCE

I declare under penalty of perjury that I am authorized to make this certification on behalf of the company submitting this bid/proposal, that as Contractor, I am familiar with the requirements of City of San Diego Municipal Code § 22.3004 regarding Contractor Standards as outlined in the WHITEBOOK, Section 5-1.4, ("Contractor Standards and Pledge of Compliance"), of the project specifications, and that Contractor has complied with those requirements.

I further certify that each of the Contractor's subcontractors has completed a Pledge of Compliance attesting under penalty of perjury of having complied with City of San Diego Municipal Code § 22.3004.

CONTRACTOR CERTIFICATION

EQUAL BENEFITS ORDINANCE CERTIFICATION

I declare under penalty of perjury that I am familiar with the requirements of and in compliance with the City of San Diego Municipal Code § 22.4300 regarding Equal Benefits Ordinance .

CONTRACTOR CERTIFICATION

EQUAL PAY ORDINANCE CERTIFICATION

Contractor shall comply with the Equal Pay Ordinance (EPO) codified in the San Diego Municipal Code (SDMC) at section 22.4801 through 22.4809, unless compliance is not required based on an exception listed in SDMC section 22.4804.

Contractor shall require all of its subcontractors to certify compliance with the EPO in their written subcontracts.

Contractor must post a notice informing its employees of their rights under the EPO in the workplace or job site.

By signing this Contract with the City of San Diego, Contractor acknowledges the EPO requirements and pledges ongoing compliance with the requirements of SDMC Division 48, section 22.4801 et seq., throughout the duration of this Contract.

AFFIDAVIT OF DISPOSAL

(To be submitted upon completion of Construction pursuant to the contracts Certificate of Completion)

WHEREAS, on the _____ DAY OF _____, 2____ the undersigned entered into and executed a contract with the City of San Diego, a municipal corporation, for:

Balboa Park Bud Kearns Aquatic Complex Improvements

(Project Title)

as particularly described in said contract and identified as Bid No. **K-20-1815-DBB-3-A**; SAP No. (WBS/IO/CC) **S-17000**; and **WHEREAS**, the specification of said contract requires the Contractor to affirm that "all brush, trash, debris, and surplus materials resulting from this project have been disposed of in a legal manner"; and **WHEREAS**, said contract has been completed and all surplus materials disposed of:

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

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

Dated this _____ DAY OF _____, _____.

By: _____
Contractor

ATTEST:

State of _____ County of _____

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

Notary Public in and for said County and State

LIST OF SUBCONTRACTORS

***** PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY *** TO BE SUBMITTED IN ELECTRONIC FORMAT ONLY *** SEE INSTRUCTIONS TO BIDDERS, FOR FURTHER INFORMATION**

In accordance with the requirements of the "Subletting and Subcontracting Fair Practices Act", Section 4100, of the California Public Contract Code (PCC), the Bidder is to list below the name, address and license number of each Subcontractor who will perform work, labor, render services or specially fabricate and install a portion [type] of the work or improvement, in an amount of or in excess of 0.5% of the Contractor's total Bid. Failure to comply with this requirement may result in the Bid being rejected as non-responsive. The Contractor is to list only one Subcontractor for each portion of the Work. The Bidder's attention is directed to the Special Provisions - Section 3-2, "SELF-PERFORMANCE", 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 [Ⓢ]	CHECK IF JOINT VENTURE PARTNERSHIP
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

- Ⓢ As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):
- | | | | |
|---|--------|--|---------|
| Certified Minority Business Enterprise | MBE | Certified Woman Business Enterprise | WBE |
| Certified Disadvantaged Business Enterprise | DBE | Certified Disabled Veteran Business Enterprise | DVBE |
| Other Business Enterprise | OBE | Certified Emerging Local Business Enterprise | ELBE |
| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |
- Ⓢ As appropriate, Bidder shall indicate if Subcontractor is certified by:
- | | | | |
|--|--------|--|----------|
| City of San Diego | CITY | State of California Department of Transportation | CALTRANS |
| California Public Utilities Commission | CPUC | | |
| State of California's Department of General Services | CADoGS | City of Los Angeles | LA |
| State of California | CA | U.S. Small Business Administration | SBA |

The Bidder will not receive any subcontracting participation percentages if the Bidder fails to submit the required proof of certification.

NAMED EQUIPMENT/MATERIAL SUPPLIER LIST

***** PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY *** TO BE SUBMITTED IN ELECTRONIC FORMAT ONLY *** SEE INSTRUCTIONS TO BIDDERS FOR FURTHER INFORMATION**

NAME, ADDRESS AND TELEPHONE NUMBER OF VENDOR/SUPPLIER	MATERIALS OR SUPPLIES	DOLLAR VALUE OF MATERIAL OR SUPPLIES	SUPPLIER (Yes/No)	MANUFACTURER (Yes/No)	MBE, WBE, DBE, DVBE, OBE, ELBE, SLBE, SDB, WoSB, HUBZone, OR SDVOSB ^①	WHERE CERTIFIED ^②
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____						
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____						

- ① As appropriate, Bidder shall identify Vendor/Supplier as one of the following and shall include a valid proof of certification (except for OBE,SLBE and ELBE):
- | | | | |
|---|--------|--|---------|
| Certified Minority Business Enterprise | MBE | Certified Woman Business Enterprise | WBE |
| Certified Disadvantaged Business Enterprise | DBE | Certified Disabled Veteran Business Enterprise | DVBE |
| Other Business Enterprise | OBE | Certified Emerging Local Business Enterprise | ELBE |
| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |
- ② As appropriate, Bidder shall indicate if Vendor/Supplier is certified by:
- | | | | |
|--|--------|--|----------|
| City of San Diego | CITY | State of California Department of Transportation | CALTRANS |
| California Public Utilities Commission | CPUC | | |
| State of California's Department of General Services | CADoGS | City of Los Angeles | LA |
| State of California | CA | U.S. Small Business Administration | SBA |

The Bidder will not receive any subcontracting participation percentages if the Bidder fails to submit the required proof of certification.

ELECTRONICALLY SUBMITTED FORMS

THE FOLLOWING FORMS MUST BE SUBMITTED IN PDF FORMAT WITH BID SUBMISSION

The following forms are to be completed by the bidder and submitted (uploaded) electronically with the bid in PlanetBids.

- A. BID BOND – See Instructions to Bidders, Bidders Guarantee of Good Faith (Bid Security) for further instructions**
- B. CONTRACTOR’S CERTIFICATION OF PENDING ACTIONS**
- C. MANDATORY DISCLOSURE OF BUSINESS INTERESTS FORM**
- D. DEBARMENT AND SUSPENSION CERTIFICATION**

Bids will not be accepted until ALL the above-named forms are submitted as part of the bid submittal

BID BOND

**See Instructions to Bidders, Bidder Guarantee of Good Faith
(Bid Security)**

KNOW ALL MEN BY THESE PRESENTS,

That MarCon Engineering, Inc. as Principal,
and Arch 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

BALBOA PARK BUD KEARNS AQUATIC COMPLEX IMPROVEMENTS, K-20-1815-DBB-3-A

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 15th day of January, 2020

MarCon Engineering, Inc. (SEAL)
(Principal)

Arch Insurance Company (SEAL)
(Surety)

By: 
(Signature)

By: 
(Signature)
Lawrence F. McMahon
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 JAN 15 2020 before me, Janice R. Martin, Notary Public,
Date Insert Name of Notary exactly as it appears on the official seal

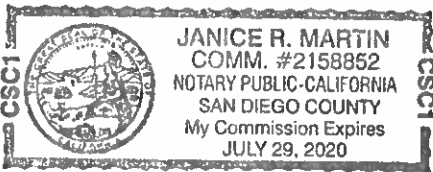
personally appeared Lawrence F. McMahon
Name(s) of Signer(s)

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

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

Witness my hand and official seal.

Signature [Handwritten Signature]
Signature of Notary Public **Janice R. Martin**



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: _____

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

Signer is Representing: _____

Surety Company

Signer's Name: _____

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

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

Signer is Representing: _____

In Testimony Whereof, the Company has caused this instrument to be signed and its corporate seal to be affixed by their authorized officers, this 11th day of June, 2018.

Attested and Certified

Arch Insurance Company

Patrick K. Nails
Patrick K. Nails, Secretary

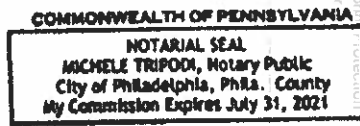


David M. Finkelstein
David M. Finkelstein, Executive Vice President

STATE OF PENNSYLVANIA SS

COUNTY OF PHILADELPHIA SS

I, Michele Tripodi, a Notary Public, do hereby certify that Patrick K. Nails and David M. Finkelstein personally known to me to be the same persons whose names are respectively as Secretary and Executive Vice President of the Arch Insurance Company, a Corporation organized and existing under the laws of the State of Missouri, subscribed to the foregoing instrument, appeared before me this day in person and severally acknowledged that they being thereunto duly authorized signed, sealed with the corporate seal and delivered the said instrument as the free and voluntary act of said corporation and as their own free and voluntary acts for the uses and purposes therein set forth.



Michele Tripodi
Michele Tripodi, Notary Public
My commission expires 07/31/2021

CERTIFICATION

I, Patrick K. Nails, Secretary of the Arch Insurance Company, do hereby certify that the attached Power of Attorney dated June 11, 2018 on behalf of the person(s) as listed above is a true and correct copy and that the same has been in full force and effect since the date thereof and is in full force and effect on the date of this certificate; and I do further certify that the said David M. Finkelstein, who executed the Power of Attorney as Executive Vice President, was on the date of execution of the attached Power of Attorney the duly elected Executive Vice President of the Arch Insurance Company.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the corporate seal of the Arch Insurance Company on this _____ day of _____, 20____.
JAN 15 2020

Patrick K. Nails
Patrick K. Nails, Secretary

This Power of Attorney limits the acts of those named therein to the bonds and undertakings specifically named therein and they have no authority to bind the Company except in the manner and to the extent herein stated.

PLEASE SEND ALL CLAIM INQUIRIES RELATING TO THIS BOND TO THE FOLLOWING ADDRESS:

Arch Insurance – Surety Division
3 Parkway, Suite 1500
Philadelphia, PA 19102



00ML0013 00 03 03
Kant'Kopyr' K1
Security Paper
Hidden Pantograph
Color Match
Artificial Watermark
Anti-Coin Rub
Erasure Protection
Security Features Box
Microprint Protection
Acid Free

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: Marcon Engineering Inc

Certified By Maryory Contreras Title CEO

Name


Signature

Date January 29, 2020

USE ADDITIONAL FORMS AS NECESSARY

Mandatory Disclosure of Business Interests Form

BIDDER/PROPOSER INFORMATION

Legal Name	DBA		
<u>Marcon Engineering Inc</u>			
Street Address	City	State	Zip
<u>876 N Broadway</u>	<u>Escondido</u>	<u>CA</u>	<u>92025</u>
Contact Person, Title	Phone	Fax	
<u>Maryory Contreras, CEO</u>	<u>760-871-0477 EXT 12</u>		

Provide the name, identity, and precise nature of the interest* of all persons who are directly or indirectly involved** in this proposed transaction (SDMC § 21.0103).

* The precise nature of the interest includes:

- the percentage ownership interest in a party to the transaction,
- the percentage ownership interest in any firm, corporation, or partnership that will receive funds from the transaction,
- the value of any financial interest in the transaction,
- any contingent interest in the transaction and the value of such interest should the contingency be satisfied, and
- any philanthropic, scientific, artistic, or property interest in the transaction.

** Directly or indirectly involved means pursuing the transaction by:

- communicating or negotiating with City officers or employees,
- submitting or preparing applications, bids, proposals or other documents for purposes of contracting with the City, or
- directing or supervising the actions of persons engaged in the above activity.

Name	Title/Position
<u>Maryory Contreras</u>	<u>CEO</u>
City and State of Residence	Employer (if different than Bidder/Proposer)
<u>Escondido, California</u>	
Interest in the transaction	

Name	Title/Position
City and State of Residence	Employer (if different than Bidder/Proposer)
Interest in the transaction	

* Use Additional Pages if Necessary *

Under penalty of perjury under the laws of the State of California, I certify that I am responsible for the completeness and accuracy of the responses contained herein, and that all information provided is true, full and complete to the best of my knowledge and belief. I agree to provide written notice to the Mayor or Designee within five (5) business days if, at any time, I learn that any portion of this Mandatory Disclosure of Business Interests Form requires an updated response. Failure to timely provide the Mayor or Designee with written notice is grounds for Contract termination.

Maryory Contreras, CEO

Print Name, Title



Signature

Jan 29, 2020

Date

Failure to sign and submit this form with the bid/proposal shall make the bid/proposal non-responsive. In the case of an informal solicitation, the contract will not be awarded unless a signed and completed Mandatory Disclosure of Business Interests Form is submitted.

DEBARMENT AND SUSPENSION CERTIFICATION

EFFECT OF DEBARMENT OR SUSPENSION
To promote integrity in the City's contracting processes and to protect the public interest, the City shall only enter into contracts with responsible bidders and contractors. In accordance with San Diego Municipal Code §22.0814 (a): <i>Bidders and contractors</i> who have been <i>debarred</i> or <i>suspended</i> are excluded from submitting bids, submitting responses to requests for proposal or qualifications, receiving <i>contract</i> awards, executing <i>contracts</i> , participating as a <i>subcontractor</i> , employee, agent or representative of another <i>person</i> contracting with the City.

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 Names of the Principal Individual owner(s)

The names of all persons interested in the foregoing proposal as Principals are as follows:

NAME	TITLE
Maryory Contreras	CEO

IMPORTANT NOTICE: If Bidder or other interested person is a corporation, state secretary, treasurer, and manager thereof; if a co-partnership, state true name of firm, also names of all individual co-partners composing firm; if Bidder or other interested person is an individual, state first and last names in full.

The Bidder, under penalty of perjury, certifies that, except as noted below, he/she or any person associated therewith in the capacity of owner, partner, director, officer, manager:

- Is not currently under suspension, debarment, voluntary exclusion, or determination of ineligibility by any Federal, State or local agency;
- has not been suspended, debarred, voluntarily excluded or determined ineligible by any Federal, State or local agency within the past 3 years;
- does not have a proposed debarment pending; and
- has not been indicted, convicted, or had a civil judgment rendered against it by a court of competent jurisdiction in any matter involving fraud or official misconduct within the past 3 years.

If there are any exceptions to this certification, insert the exceptions in the following space.

None

Exceptions will be considered in determining bidder responsibility. For any exception noted above, indicate below to whom it applies, initiating agency, and dates of action.

Contractor Name: Marcon Engineering Inc

Certified By Maryory Contreras Title CEO

Name

 Signature

Date Jan 29, 2020

NOTE: Providing false information may result in criminal prosecution or administrative sanctions.

City of San Diego

CITY CONTACT: Juan E. Espindola, Senior Contract Specialist, Email: JEEspindola@sandiego.gov
Phone No. (619) 533-4491

ADDENDUM A



FOR

BALBOA PARK BUD KEARNS AQUATIC COMPLEX IMPROVEMENTS

BID NO.: K-20-1815-DBB-3-A
SAP NO. (WBS/IO/CC): S-17000
CLIENT DEPARTMENT: 1714
COUNCIL DISTRICT: 3
PROJECT TYPE: BE

BID DUE DATE:

**2:00 PM
JANUARY 29, 2020**

CITY OF SAN DIEGO'S ELECTRONIC BIDDING SITE, PLANETBIDS

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

A. CHANGES TO CONTRACT DOCUMENTS

The following changes to the Contract Documents are hereby made effective as though originally issued with the bid package. Bidders are reminded that all previous requirements to this solicitation remain in full force and effect.

THE SUBMITTAL DATE FOR THIS PROJECT HAS BEEN **EXTENDED AS STATED ON THE COVER PAGE.**

James Nagelvoort, Director
Public Works Department

Dated: *January 10, 2020*
San Diego, California

JN/RWB/br

City of San Diego

CITY CONTACT: Juan E. Espindola, Senior Contract Specialist, Email: JEEspindola@sandiego.gov
Phone No. (619) 533-4491

ADDENDUM B



FOR

BALBOA PARK BUD KEARNS AQUATIC COMPLEX IMPROVEMENTS

BID NO.: K-20-1815-DBB-3-A
SAP NO. (WBS/IO/CC): S-17000
CLIENT DEPARTMENT: 1714
COUNCIL DISTRICT: 3
PROJECT TYPE: BE

BID DUE DATE:

**2:00 PM
FEBRUARY 05, 2020**

CITY OF SAN DIEGO'S ELECTRONIC BIDDING SITE, PLANETBIDS

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

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:

Sandra S. Gramley
1) Registered Architect

1-24-2020
Date

Seal:



[Signature]
2) For City Engineer

1/24/20
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. Site demo plan sheet C-100 calls for note #1 - "Protect in Place" at the storage area on the southeast side of the site, but arch plan demo sheet A-001, calls for note # 11 "remove (e) visual screening and (e) fence fabric; please clarify.
- A1. Fence fabric and visual screening is to be removed per Note 11/C-100 and 11/A-100.
- Q2. The vertical scale in this drawing does not appear to be to scale; please verify and provide a correct scalable sheet.
- A2. A-001 and A-002 are shown at 1"=15'. Other plans in the set are standard and scalable.
- Q3. Keynote #10 on sheet A-002 shows (e) bleacher seating to remain, but these bleachers seem to be located where the new accessible pavement is to be built. Please clarify.
- A3. Bleacher seating is to remain - the bleachers will need to be relocated during concrete construction and re-installed.
- Q4. Keynote 27 on sheet A-100 indicates "remove and salvage existing carbon dioxide tanks". Keynote 25 on sheet A-110 indicates "existing carbon dioxide tanks". Please clarify if these tanks are to be re-installed or just salvaged and turned over to the Owner.
- A4. CO2 tanks are to be reinstalled.
- Q5. Sheet A-002 calls out keynote #24 for "(e) light pole to remain and be protected. Raised w/ extension bots. reference 9/A-502", but the referenced detail indicates that the new pole, decorative pole, mounting bolts and conduit extenders are BY OTHERS; please clarify if any of this scope is to be by the GC.

- A5. The scope of the detail is to raise the existing extension bolts for the future installation of a light pole.
- Q6. The referenced detail 2/A-502 on sheet A-200 is incorrect; it should reference detail 1/A-502; please verify.
- A6. Alcove barrier detail 1/A502 is referenced in Note 8/A-200. Accessible bench seating detail 2/A502 is referenced in Note 1/A-200.
- Q7. Detail 4/A-400 references detail 5/A-200, but this detail is omitted; please verify.
- A7. There is no 5/A-200 elevation of the Women's lavatories. Revise reference on 4/A-400 to "3/A-200 similar and reversed". Please see changes in this addendum.
- Q8. The referenced detail 5/SP-7 on detail 2/SP-8 seems to be incorrect; it appears it should reference detail 5/SP-8; please verify.
- A8. That is correct. 5/SP-8 is right referenced detail. Please see changes in this addendum.
- Q9. The vertical dimensions shown on details 3 and 4/SP-8 and 2/A-300 do not match the elevations called out on the floor plan and on the same details. The vertical dimensions shown on these details add up to 15'; whereas, the same section details show the finish floor elevations between these dimensions at 13' (13'-6" on detail 2/A-300). Also, the floor plans indicate this elevation to be at 13'-6". Please clarify which dimension is correct.
- A9. Use the 13'-6" dimension from the first level to the lower level as shown on the Architectural section 2/A-300.
- Q10. Keynote #5 "(E) pump and motor, mounted on conc. pad see 3/S-501" is keyed-in on lower level 1, where the existing metal grate is to be demolished and the new concrete pad is to be built, but this note does not indicate for the existing pump and motor to be re-installed. Please clarify if this equipment is the equipment that is being removed per keynote 9 on sheet A-100; if so, please indicate to remove and salvage this item on the demo plan (keynote 9/A-100) and indicate to reinstall it in the floor plan (keynote 5/A-110). The MEP plans do not show this item being removed and reinstalled either.
- A10. Existing pump and motor are to be reinstalled. See E3/E-110 for relocated pump notes.

- Q11. Detail 3/A-300 shows the surge chamber location to be a 3'-0" opening and to be located 2'-1/2" from the existing interior face of wall to the manhole opening; whereas, details on sheet SP-8 show the manhole opening to be 2'-6" (3'-6" including walls) and the manhole located against the existing wall; please verify which dimensions are correct.
- A11. Use the dimensions shown on SP-8. Please see changes in this addendum.
- Q12. Details 2 & 3/A-300 show a note indicating to patch the concrete slab per SDG-155 and SDG-156; whereas, sheet S-101 calls for detail 5/S002 for the patching; please verify.
- A12. Detail 5 on Sheet S-002 shall be used for typical concrete slab infill.
- Q13. Details A & A1/S-501 show a new concrete footing for the new walls at level 2, under the mechanical room, and it calls for drilled epoxy dowels to be installed at one face of the footing; it is unclear if this detail applies only where there is an adjacent footing or if the dowels are to be installed on the existing slab on grade. Also, please clarify if the existing slab on grade should be saw-cut to allow the new footing be built (and new footing dowel into the sog) or if the entire slab on grade is to be demoed since the space is to be filled with 3/4" gravel.
- A13. Detail A & A1 on Sheet S-501 show the new concrete footing will be doweled into the adjacent existing concrete which include existing concrete footing and existing slab on grade. See attached for the approximate dowel locations on the plan. The existing slab on grade should be saw-cut to construct the new concrete footing. The existing slab on grade shall be cut where requires. Please see changes in this addendum.
- Q14. The door/gate schedule included in sheet A-600 calls for gates #G101, G102 and G103 with a 7'0" door height and references door type B, but door type B calls for an 8'-0" high gate. Also, detail 1/A-501 calls for an 8'-0" high gate; please clarify.
- A14. All gates to be 8'-0" in height.
- Q15. The site plan sheet A-002 show keynote #2 "4'-0" wide pedestrian gate per 5/A-501" at the northeast side of the site, north side of the sun deck, but this gate is not called out to be removed on the demo plan sheet A-100 and is not included in the door/gate schedule sheet A-600; please clarify.

- A15. There are (2) gates to be replaced per key note 2/A-002. These gates are G104 and G105 in the schedule on A-600.
- Q16. Supplementary Special Provisions, Section 2-2.2 indicates “The allowance bid item for “Building Permits” shall also include but is not limited to the following permits: a) Building, b) Demolition/removal, c) Department of Environmental Health, d) Shoring (if applicable)”; please verify that the GC will be responsible for paying the fees for the aforementioned items and that a separate ALLOWANCE items should be submitted separate from the base bid.
- A16. Refer to Whitebook – Section 2-2.3 Payments, Item #1 specify, the payment for procuring Building Permits shall be included in the Allowance Bid item for “Building Permits” for the Base Bid.
- Q17. Supplementary Special Provisions, Section 3.2 - Self-Performance indicates “You shall perform, with your own organization, Contract Work amounting to at least 30% of the Base Bid”; please verify if this requirement is applicable to this project as it seems that the pool scope and supporting scope (MEP) would be more than 70% of the project, which would not allow a GC to self-perform at least 30% of the base Bid, which means that the work would have to be performed by a pool contractor acting as a General Contractor.
- A17. Self-performance of 30% to remain.
- Q18. Supplementary Special Provisions, Section 4.3.4.3 indicates “The contractor shall hire a licensed geotechnical engineer to perform specialty inspection of any geotechnical related requirements necessary for execution of work”; it appears that the only work that might be impacted by geotechnical requirements is the installation of new foundation wall footings as shown on drawing sheet S-101, but there is a note by the Structural Engineer of Record indicating that “the structure(s) will be located entirely on undisturbed native soil. If the building inspector suspects fill, expansive soils or any geologic instability based upon observation of the foundations excavation, a soils or geological report, and resubmittal of plans to plan check to verify that the report recommendations have been incorporated, maybe required.” please clarify if the General Contractor should carry an ALLOWANCE for this potential additional work or if it should be brought up only once it is determined that it might be an issue and this additional scope would be treated as a change order.

- A18. Once verified, potential additional work related to any geotechnical will be treated as a change order.
- Q19. Supplementary Special Provisions, Section 7-3.1.4 indicates "The payment for all lead abatement, handling, and disposal Work required per Appendix G – Inspection Report Asbestos and Lead shall be included in the allowance Bid item for "Lead Paint Handling and Disposal""; please clarify if the GC is to determine the cost for lead abatement and include this cost as an "ALLOWANCE" separate from the base bid (item 7-3.1.3) or if the City of San Diego will provide an ALLOWANCE amount to be used by all the GCs.
- A19. Refer to Item D – Additional Changes of this Addendum B.
- Q20. Details A& A1/S-501 call for an 8" thick CIP concrete wall for all 3 walls at the lower level 2, but the foundation plan scales these walls as 10" and 12", respectively; please verify that all these walls are to be 8" thick (the adjacent walls at the surge tank room are called out to be 10" and scale also as 10").
- A20. All three walls are 8" thick. See Note 3 in "General" section on Sheet S-001.
- Q21. Please provide a detail for the concrete wall footing to be built against the east side of the existing brick chimney (similar to A/S-501).
- A21. The new concrete footing adjacent to the east side of the brick chimney is outlined in red, which has a minimum depth of 1'-6" and footing width shall be field verified. The new concrete footing in the outlined area does not need to be doweled into the adjacent existing chimney and/or footing. Please see changes in this addendum.
- Q22. Floor plan sheet A-110 has note #28 "(E) hose bibb to remain" pointing at an existing column within the mechanical room at the first level; the structural floor plan sheet S-101 shows this column being furred out with concrete per detail 6/S-501. The plumbing plans do not show this existing hose bibb. Please verify if this note is an error or clarify.
- A22. There is a surface mounted hose bibb (pipe runs from the ceiling) on that column, approx. 36" above the floor. It should not conflict with column concrete encasement.
- Q23. Details 4 and 6/S-501 reference the architectural plans for the height of the column concrete encasement height, but the architectural plans omit this height; please provide/verify.

- A23. Concrete encasement height to be 20".
- Q24. Detail 3/S-501 references the architectural plans for the dimensions (only shows 2'-0" max height. Scales as 5'-6" x 2'-3") of the concrete plinth, but the architectural plans omit these dimensions; please provide.
- A24. Refer to Dimensions of the concrete plinth for mounting the pump are 5'- 6" x 2'-3". Please see changes in this addendum.
- Q25. Site layout plan keynote 14/SP-3 calls for 10" thick shotcrete walls per detail 2/SP-8, but the referenced detail calls for reinforced concrete; please clarify if these walls will be required to be CIP (cast-in-place) or shotcrete or if it is optional.
- A25. It doesn't matter whether the walls are cast-in-place concrete or pneumatically placed concrete (shotcrete). What matters is that the design strength of 3,000 psi is achieved.
- Q26. Keynote #5 on the civil site plan sheet C-200 indicates "pool deck per swimming pool site layout plans."; keynote #12 on swimming pool site layout sheet SP-3 indicates "new decking and deck drains to be installed per civil plans..." Swimming pool site plans sheet SP-1 shows the pool deck layout similar to the layout on the civil plans, but does not provide info on the concrete decking; please provide details/info for the concrete deck thickness, reinforcing, if any (detail 1/SP-9 for lift reinstatement shows reinforcing), and expansion/control joints as well as any subgrade compaction requirements (scarification, if applicable).
- A26. Pool deck construction:
Compact subgrade at optimum moisture content =/-1% to 95% firm and unyielding. Provide 6" min. thickness slab with #4 bars at 16" each way at mid-depth of slab, 3000 psi concrete with 5% (+/-1%) air entrainment and maximum water-cement ratio of 0.50. Provide control joints at 6 feet oc max and expansion joints at 30 feet oc max.
- Q27. Plumbing demolition floor plan sheet P-100 shows keynote #1 "2" pipe to existing roof drain" in the first floor mechanical room and it shows the pipe as a dashed line (legend does not identify this dashed legend). The keynote does not indicate if it is existing to remain or existing to be removed. Plumbing floor plan sheet P-110 shows keynote #3 "connect 2" storm drain to existing roof drain" at the same location where the demo sheet calls for note #1, but the layout for the poc is slightly

different; please clarify if the 2" piping going from the lower level 1 to the roof is to be rerouted to accommodate the new layout and clarify note # 1 as exiting to remain as appropriate. Also, please clarify if the square symbol is supposed to be an existing floor drain to be removed and re-installed as this symbol is not identified (a floor drain symbol seems to be shown a few feet away).

- A27. The existing fixture is a roof drain and is to remain. The location is diagrammatic and should be field verified. The dashed line is showing piping to be removed as labeled at all other locations on the plans. The note "1" pointing to the piping should have been labeled "2". The note "1" pointing to the roof drains is correct. Please see changes in this addendum.
- Q28. Plumbing demolition floor plan sheet P-100 shows keynote #9 "remove existing 2" waste" at the lower level 2. Plumbing floor plan sheet P-110 shows keynote #4 "replace 4" waste..." for the same item; please clarify. Also, sheet P-100 shows the line above keynote #9 as a 2" waste, but it appears that this item is a 2" vent; please verify.
- A28. The existing piping is corroded and beyond it's useful life. The intent is to replace all of the existing piping below grade and a portion of piping above grade with new piping. Note #4 is incorrect, please follow the floor plans for pipe sizes and locations. All existing waste piping should be removed and replace with new. A new floor drain and vent to roof is being added. The 2" waste piping in question changes to a vent piping at the first level. Please see changes in this addendum.
- Q29. The project construction duration is noted to be 220-working-days per Scope of Work, section 3; the Supplementary Special Provisions, section 6-1.1.3 indicates "The Bud Kearns Pool must be reopened for public use during "pool peak" time from June 15 - September 15" and section 6-2.1.3 (Moratoriums) indicates "Do not Work in the areas where there is currently a moratorium issued by the City. The areas subject to moratorium are listed below: Swimming Pool Peak from June 15 to September 15 (inclusive)". Please clarify if the 220-working days include this 3-month break, which seems would halt all construction operations, or if these 3-months are in addition to the 220-working days.
- A29. Moratoriums modified. Refer to Item D of this Addendum.

- Q30. The Supplementary Special Provisions, section 6-1.1.3 indicates "The Bud Kearns Pool must be reopened for public use during "pool peak" time from June 15 – September 15" and section 6-2.1.3 (Moratoriums) indicates "Do not Work in the areas where there is currently a moratorium issued by the City. The areas subject to moratorium are listed below: Swimming Pool Peak from June 15 to September 15 (inclusive)". Please clarify if all construction operations would have to be halted in order for the pool to be functional/occupied or if the contract is to be executed right away, but the work scope would have to start after September 15 since it does not seem feasible to start construction in February/March and finish the work by June 15 or stop the progress on June 15th and make the pool operational again while the facility is being gutted.
- A30. Moratoriums modified. Refer to Item D of this Addendum.
- Q31. The drawings and specs do not show a location or provisions for the GC's construction staging and laydown area. Please show the location where the Contractor can have a site office and area for delivery and storage of materials and equipment (i.e. location within the fenced pool area or does the GC need to provide temp fencing outside the facilities, etc.).
- A31. Attachment E – Supplementary Special Provisions, Section 3-12.4.3, Item #4 stated that the contractor shall coordinate with Park and Rec. Staff and pool manager prior to the start of construction for the approval of laydown or staging areas. Section 600-2, Vehicular Access, Item #5 stated the contractor shall verify to the Park and Recreation Staff for vehicular access to the work site for delivery of materials and equipment intended for the project.
- Q32. Keynote 18 on sheet C-200 -Site Plan, indicates "see MEP plans for removals and design"; this keynote is keyed-in on the plan at (6) locations for electrical (for "elec (typ)" and two for "pool light control") and (6) locations for plumbing (two for "water spigot", two for "drinking fountains", two for "water shut-ff valve"), but the MEP plans do not show any removals and design of these items, except for the drinking fountains. Please clarify.
- A32. Revise keynote 18 on C-200 Site Plan to read "Protect existing plumbing and electrical elements in place during construction." Except the Drinking Fountain note should stay the same, it is the only deck element

being removed and replaced, notes and details for that work are on sheet P-110. Please see changes in this addendum.

- Q33. The specification section 09 91 13 -Exterior Painting only provides requirement for painting exterior stucco, but omits requirements for painting interior walls (for patching existing), metal fencing (existing and new fence framework per keynote 1 on sheet A-002) and doors/misc. items, if required; please provide.
- A33. Since the locker and restrooms are open to the outside the exterior painting spec 099113 covers the areas. Please see changes in this addendum.
- Q34. Sheet 7-D is indicating a storm drain line that is to be protected in place. However it is calling out for the installation for quite a few inlets and cleanouts. Please clarify whether we are to install an entirely new Storm Drain or not.
- A34. No new storm drain is to be installed, only the inlets and cleanouts as shown.
- Q35. In regards to the SLBE/ELBE requirement, as two of the potential prime bidders are businesses with those designations, are we required to solicit them as part of the good faith effort should the bid not meet the percentages set out in the bid documents?
- A35. Please refer to the 2018 Whitebook, Section B - SLBE-ELBE Subcontracting Requirements, Subsection 0-8 Good Faith Effort Documentation.

C. ATTACHMENTS

1. To ATTACHMENT E – Technicals, page 156, Section 099113, EXTERIOR PAINTING SCHEDULE, **ADD** the following:
 - B. Steel and Iron Substrates:
 1. Acrylic System:
 - a. Prime Coat: Acrylic Ferrous Metal Primer. S-W ProCryl B66
 - b. Intermediate Coat: Exterior Acrylic Latex. Match topcoat.
 - c. Topcoat: Exterior Acrylic Latex, semigloss. S-W Sologloss Acrylic Semigloss A 76 Series.

C. Wood Substrates: Wood trim, and Architectural woodwork.

1. Latex System:

a. Prime Coat: Exterior Latex Wood Primer. S-W Prep Rite Pro Block B51W8020.

b. Intermediate Coat: Exterior Acrylic Latex. Match topcoat.

c. Topcoat: Exterior Acrylic Latex, semigloss. S-W Sologloss Acrylic Semigloss A 76 Series.

D. SUPPLEMENTARY SPECIAL PROVISIONS

1. To Section 6, Prosecution and Progress of the Work, 6-1.1, Construction Schedule, number 3, page 47, **DELETE** in its entirety.
2. To Section 6, Prosecution and Progress of the Work, 6-2.1, Moratoriums, page 47, **DELETE** in its entirety.

E. ADDITIONAL CHANGES

1. The following are additional changes to the Line Items in the PlanetBids Tab:

For clarity where applicable, **ADDITIONS**, if any, have been Underlined and **DELETIONS**, if any, have been **Stricken out**.

Section	Item Code	Description	UoM	Quantity	Payment Reference	Extension
Main Bid	238990	Lead Paint Handling, <u>Abatement, Removal, Transportation</u> and Disposal (EOC Type I)	AL	1	7-3.1	\$6000

F. PLANS

1. To Drawing No. 40665-1-D, Reference Sheet G-001 – Title Sheet, **DELETE** in its entirety and **REPLACE** with page 14 of 21 of this Addendum.
2. To Drawing No. 40665-7-D, Reference Sheet C-200 – Site Plan, **DELETE** in its entirety and **REPLACE** with page 15 of 21 of this Addendum.
3. To Drawing No. 40665-17-D, Reference Sheet A-110 – Construction Floor Plans, **DELETE** in its entirety and **REPLACE** with page 16 of 21 of this Addendum.
4. To Drawing No. 40665-20-D, Reference Sheet A-400 – Enlarged Plans, **DELETE** in its entirety and **REPLACE** with page 17 of 21 of this Addendum.

5. To Drawing No. 40665-27-D, Reference Sheet S-101 – Structural Plans, **DELETE** in its entirety and **REPLACE** with page 18 of 21 of this Addendum.
6. To Drawing No. 40665-37-D, Reference Sheet SP-8 – Miscellaneous Details, **DELETE** in its entirety and **REPLACE** with page 19 of 21 of this Addendum.
7. To Drawing No. 40665-40-D, Reference Sheet P-100 – Plumbing Floor Plan - Demolition, **DELETE** in its entirety and **REPLACE** with page 20 of 21 of this Addendum.
8. To Drawing No. 40665-41-D, Reference Sheet P-101 – Plumbing Floor Plan - New, **DELETE** in its entirety and **REPLACE** with page 21 of 21 of this Addendum.

James Nagelvoort, Director
Public Works Department

Dated: *January 24, 2020*
San Diego, California

JN/RWB/br

BUD KEARNS AQUATIC COMPLEX IMPROVEMENTS

2229 MORLEY FIELD DRIVE, SAN DIEGO, CA 92104

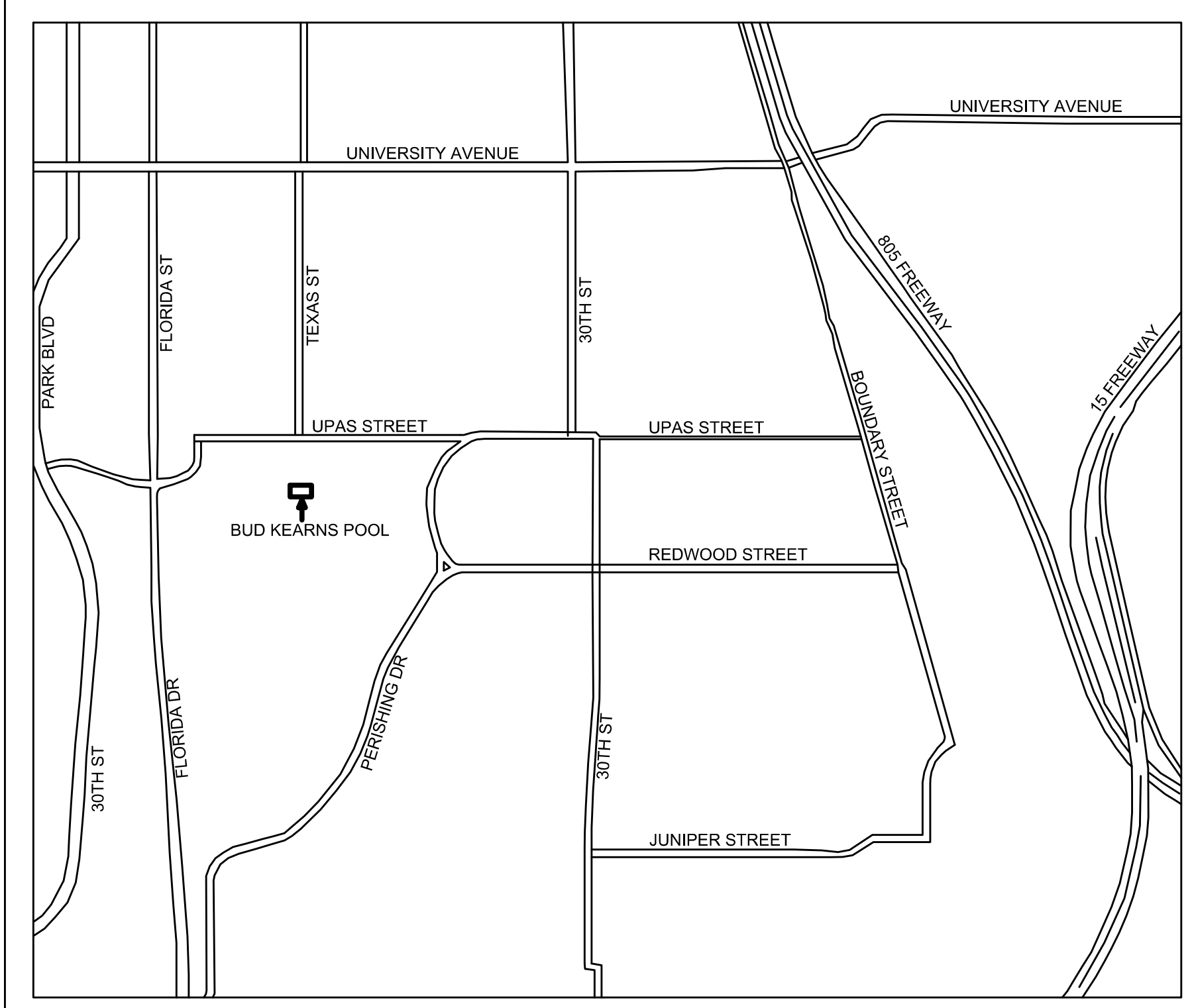
DESCRIPTION OF WORK

BUILDING RENOVATIONS TO INCLUDE UPGRADES TO THE POOL AND POOL SYSTEMS TO MEET DEPARTMENT OF ENVIRONMENTAL HEALTH REQUIREMENTS; ACCESSIBILITY UPGRADES AT THE POOL DECK AND LOCKER ROOMS; ACCESSIBLE PATH OF TRAVEL UPGRADES FROM THE PARKING AREA INCLUDING SIGNAGE; FENCING AND GATE IMPROVEMENTS.

CITY OF SAN DIEGO POLICY COMPLIANCE

- BACKFLOW DEVICE IS EXISTING AND SHALL BE PROTECTED AS PART OF THIS PROJECT. UNLESS OTHERWISE NOTED.
- COMPLY WITH HAZARDOUS MATERIALS PER CITY OF SAN DIEGO BULLETIN 116
- COMPLY WITH CONSTRUCTION AND DEMOLITION DEBRIS PER CITY BULLETIN 119
- COMPLY WITH STORM WATER REQUIREMENTS PER CITY OF SAN DIEGO STORM WATER MANAGEMENT PLAN AS DETERMINED BY FORM DS-560. PROJECT DOES NOT DISTURB MORE THAN 1 ACRE AND CREATES LESS THAN 5000 S.F. OF IMPERVIOUS SURFACE. PROJECT DOES NOT REQUIRE A N.P.D.E.S. PERMIT. PROJECT WILL REQUIRE CONSTRUCTION B.M.P. PER SECTION IV OF THE CITY OF SAN DIEGO'S STORM WATER STANDARDS MANUAL.

LOCATION MAP



PARK CONSTRUCTION INSPECTION STAGES AND INSPECTION TEAM

- PARK INSPECTION TEAM**
- A. SITE SUPERINTENDENT (CONTRACTOR/DEVELOPER'S REPRESENTATIVE)
 - B. CONTRACTOR(S)
 - C. RESIDENT ENGINEER FROM CONSTRUCTION MANAGEMENT & FIELD SERVICES
 - D. CITY PROJECT MANAGER
 - E. DESIGN CONSULTANT
 - F. PARK AND RECREATION DISTRICT MANAGER
 - G. PARK AND RECREATION ASSET MANAGER

MONUMENTATION/SURVEY NOTES

THE CONTRACTOR SHALL BE RESPONSIBLE FOR SURVEY MONUMENTS AND/OR VERTICAL CONTROL BENCHMARKS WHICH ARE DISTURBED OR DESTROYED BY CONSTRUCTION. A LICENSED LAND SURVEYOR OR LICENSED CIVIL ENGINEER AUTHORIZED TO PRACTICE LAND SURVEYING IN THE STATE OF CALIFORNIA SHALL FIELD LOCATE, REFERENCE, AND/OR PRESERVE ALL HISTORICAL OR CONTROLLING MONUMENTS PRIOR ANY EARTHWORK, DEMOLITION OR SURFACE IMPROVEMENTS. IF DESTROYED, A LICENSED LAND SURVEYOR SHALL REPLACE SUCH MONUMENT(S) WITH APPROPRIATE MONUMENTS. WHEN SETTING SURVEY MONUMENTS USED FOR RE-ESTABLISHMENT OF THE DISTURBED CONTROLLING SURVEY MONUMENTS AS REQUIRED BY SECTIONS 6730.2 AND 8771 OF THE BUSINESS AND PROFESSIONS CODE OF THE STATE OF CALIFORNIA, A CORNER RECORD OR RECORD OF SURVEY, AS APPROPRIATE, SHALL BE FILLED WITH THE COUNTY SURVEYOR. IF ANY VERTICAL CONTROL IS TO BE DISTURBED OR DESTROYED, THE CITY OF SAN DIEGO FIELD SURVEY SECTION SHALL BE NOTIFIED IN WRITING AT LEAST 7 DAYS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COST OF REPLACING AND VERTICAL CONTROL BENCHMARKS DESTROYED BY THE CONSTRUCTION.

PROJECT DIRECTORY

CLIENT/LEGAL OWNER
CITY OF SAN DIEGO
PUBLIC WORKS DEPARTMENT
ENGINEERING & CAPITAL PROJECTS
525 B STREET SUITE 750 MS #908A
SAN DIEGO, CA 92101-3865
PHONE: (619) 533-6635
MICHELLE GARCIA-QUILICO

CIVIL ENGINEER
KIMLEY-HORN & ASSOCIATES, INC
401 B STREET,
SUITE 600
SAN DIEGO, CA 92101
PH: (619) 234-9411

POOL ENGINEER
PATRELL ENGINEERING GROUP, INC.
751 SUNNY GROVE LANE,
GLEN DORA, CA 91741
PH: (626) 335-4362
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ARCHITECT
PLATT/WHITELAW ARCHITECTS, INC.
4034 30TH STREET
SAN DIEGO, CA 92104
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FAX: (619) 546-4350
SANDRA GRAMLEY, PROJECT ARCHITECT

STRUCTURAL ENGINEER
AARK ENGINEERING, INC.
1870 CORDELL COURT, SUITE 202
SAN DIEGO, CA 92020
PH: (619) 312-6336
FAX: (619) 312-6560

MECHANICAL/PLUMBING ENGINEER
BENDER DEAN ENGINEERING
444 CAMINO DEL RIO
SOUTH,
SUITE 201
SAN DIEGO, CA 92108
PH: (619) 704-1900
FAX: (858) 427-1608

ELECTRICAL ENGINEER
TURPIN & RATTAN ENGINEERING, INC
4719 PALM AVENUE,
LA MESA, CA 91941
PH: (619) 466-6224
FAX: (619) 466-6233

CONSTRUCTION STORM WATER PROTECTION NOTES

- TOTAL SITE DISTURBANCE AREA (ACRES) 0.12 AC. OF SITE
HYDROLOGIC UNIT/ WATERSHED PUEBLO SAN DIEGO
HYDROLOGIC SUBAREA NAME & NO. CHOLLAS 908.22
- THE CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS OF THE WPCP THE PROJECT IS SUBJECT TO MUNICIPAL STORM WATER PERMIT NO. R9-2013-0001 AS AMENDED BY R9-2015-0001 AND R9-2015-0100

SWPPP
THE PROJECT IS SUBJECT TO MUNICIPAL STORM WATER PERMIT NO. R9-2013-0001 AS AMENDED BY R9-2015-0001 AND R9-2015-0100 AND CONSTRUCTION GENERAL PERMIT ORDER 2009-0009-DWQ AS AMENDED BY ORDER 2010-0014-DWQ AND 2012-0006-DWQ
TRADITIONAL: RISK LEVEL 1 2 3
LUP: RISK TYPE 1 2 3
- CONSTRUCTION SITE PRIORITY
 ASBS HIGH MEDIUM LOW

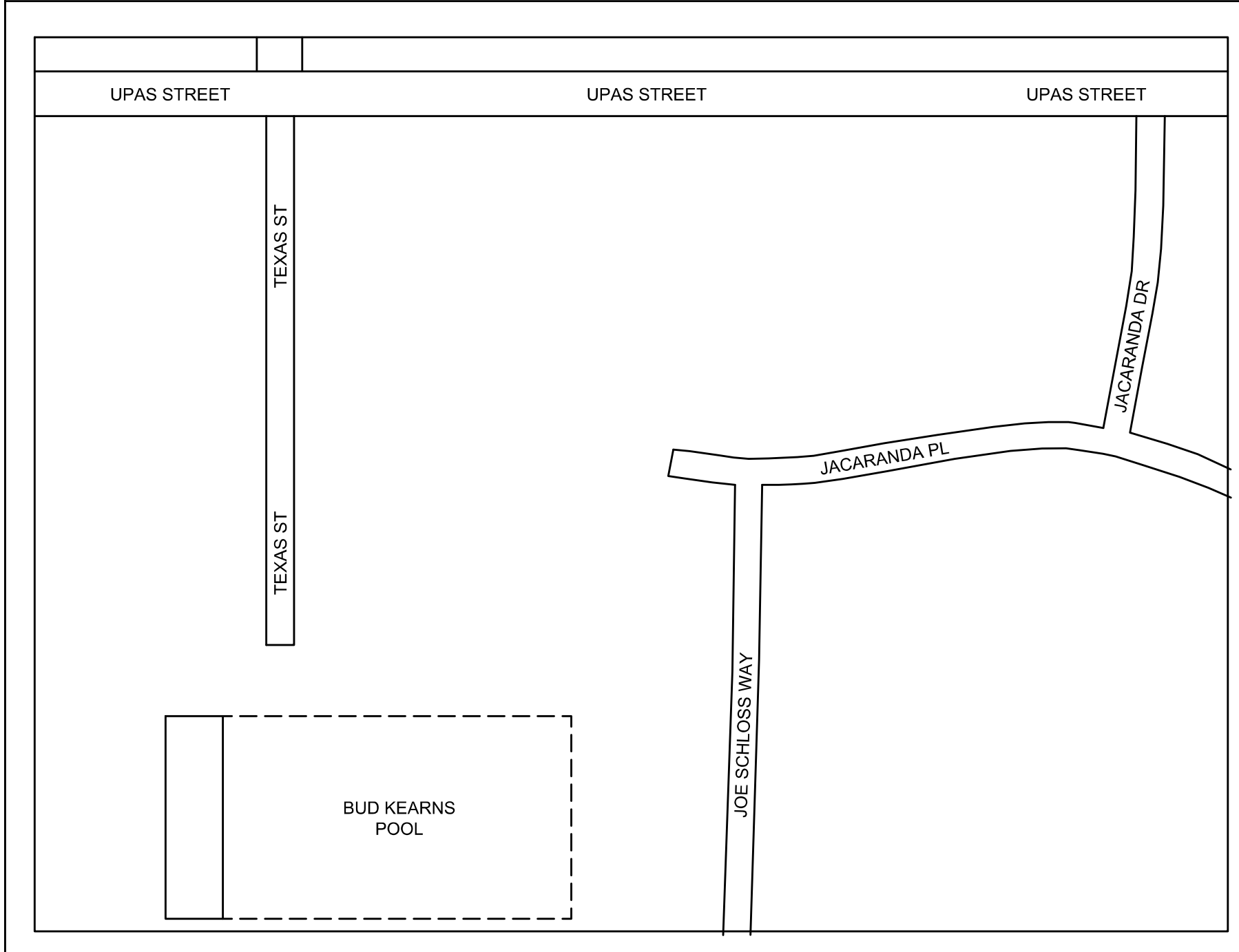
RESPONSIBLE CHARGE

I HEREBY DECLARE THAT I AM THE ARCHITECT OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED REASONABLE CARE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME AS ARCHITECT OR ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

Sandra Gramley
SANDRA GRAMLEY C-21073 DATE 04-30, 2021
PLATT/WHITELAW ARCHITECTS INC.

LOCATION MAP



UNDERGROUND UTILITIES

BEFORE EXCAVATING, VERIFY THE LOCATION OF UNDERGROUND UTILITIES. AT LEAST THREE (3) WORKING DAYS PRIOR TO EXCAVATION, THE CONTRACTOR SHALL REQUEST A MARKOUT OF UNDERGROUND UTILITIES BY CALLING THE BELOW LISTED REGIONAL NOTIFICATION CENTER FOR AN INQUIRY IDENTIFICATION NUMBER:

UNDERGROUND SERVICE ALERT 800-422-4133
(GAS, ELECTRIC, TELEPHONE, WATER, SEWER, LIGHTING & T.V.)

CITY IRRIGATION SYSTEMS & WIRING 619-533-5783

CITY FACILITIES MAINTENANCE DIVISION 619-525-8500

LEGAL DESCRIPTION

ASSESSOR'S PARCEL NUMBER: 760-212-1200
YEAR OF CONSTRUCTION: 1932

OCCUPANCIES & TYPE OF CONSTRUCTION

NO CHANGE OF OCCUPANCIES OR TYPE OF CONSTRUCTION PROPOSED.

BUILDING OCCUPANCIES INCLUDE A-5

TYPE OF CONSTRUCTION IS V-A.

NON-SPRINKLERED

SEE SHEET G-004 FOR COMPLETE CODE ANALYSIS.

AS-BUILT INFORMATION

MATERIALS	MANUFACTURER
-	-
-	-
-	-
-	-

BUD KEARNS AQUATIC COMPLEX IMPROVEMENTS

TITLE SHEET

G-001

CONSTRUCTION CHANGE / ADDENDUM			
CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.
8	1/24/20	C-200, A-110, A-400, S-101, SP-8, P-100, P-110	

WARNING

0 1

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.



CONSULTANT

PLATT/WHITELAW ARCHITECTS, INC.

4034 30th Street, SAN DIEGO CA 92104
(619) 546-4326 FAX (619) 546-4350

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
out of 54

APPROVED: *Jason Grani* DATE 11/14/2019
FOR CITY ENGINEER JASON GRANI DATE C77208
PRINT NAME RCE#

SUBMITTED BY: MICHELLE GARCIA-QUILICO PROJECT MANAGER
CHECKED BY: DAVID SENAH PROJECT ENGINEER

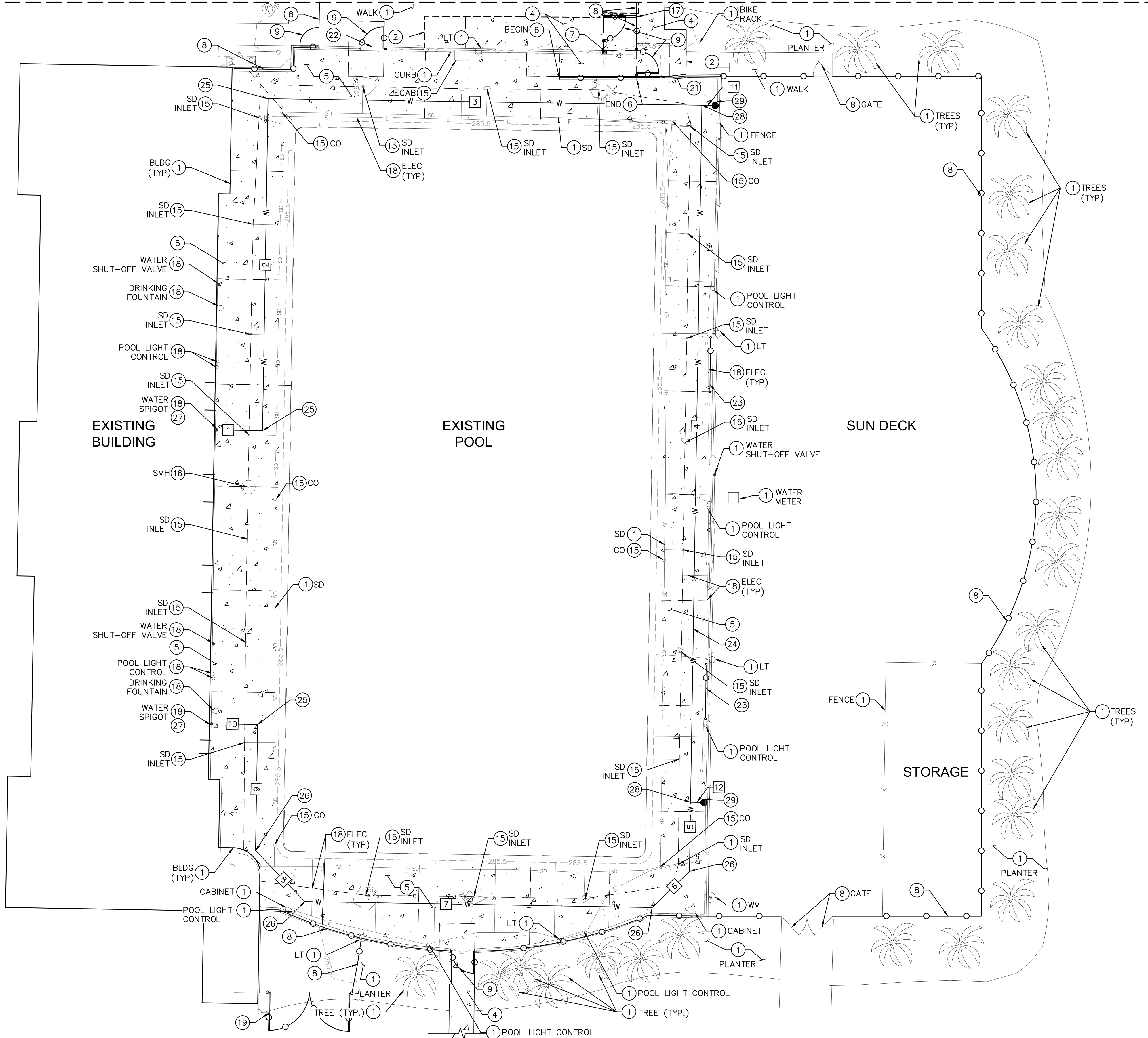
DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PWA		11/14/19	

CONTRACTOR: _____ DATE STARTED: _____
INSPECTOR: _____ DATE COMPLETED: _____

40665 - 1 - D

BUD KEARNS AQUATIC COMPLEX IMPROVEMENTS

MATCHLINE SEE SHEET C-201

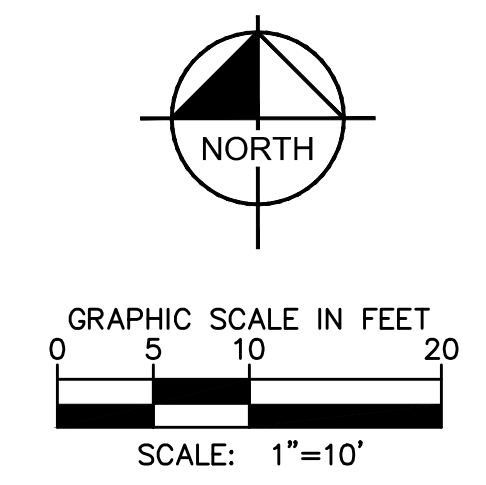


WATER LINE TABLE		
LENGTH	BEARING	DESCRIPTION
1	8.26'	N89°02'43.72"W 1" PVC, SCH-80 (SLEEVED)
2	60.12'	S0°57'16.28"W 1" PVC, SCH-80 (SLEEVED)
3	78.51'	S89°07'42.12"E 1" PVC, SCH-80 (SLEEVED)
4	126.19'	N0°55'51.42"E 1" PVC, SCH-80 (SLEEVED)
5	12.54'	N0°55'51.42"E 1" PVC, SCH-80 (SLEEVED)
6	9.36'	N45°55'51.42"E 1" PVC, SCH-80 (SLEEVED)
7	62.88'	S89°02'10.03"E 1" PVC, SCH-80 (SLEEVED)
8	12.83'	S44°04'08.58"E 1" PVC, SCH-80 (SLEEVED)
9	22.84'	S0°57'16.28"W 1" PVC, SCH-80 (SLEEVED)
10	8.34'	S89°02'43.72"E 1" PVC, SCH-80 (SLEEVED)
11	2.43'	N89°04'08.58"W 1" PVC, SCH-80 (SLEEVED)
12	2.43'	N89°04'08.58"W 1" PVC, SCH-80 (SLEEVED)

LEGEND

- CONCRETE (INCLUDES SIDEWALKS, DRIVEWAYS, AND OTHER CONCRETE SURFACING)
- ASPHALT PAVEMENT
- MILL AND OVERLAY
- SAWCUT
- GRADE BREAK

- CONSTRUCTION NOTES:**
- PROTECT IN PLACE.
 - REPAINT 4" WHITE LINE
 - CONSTRUCT 4" PCC WALK PER SDPWC SDG-155, SDG-156 AND SDRSD G-10.
 - POOL DECK PER SWIMMING POOL SITE LAYOUT PLANS.
 - INSTALL PEDESTRIAN WALKWAY AND PROTECTIVE RAILING PER SDPWC SDM-115.
 - CONSTRUCT MODIFIED CURB. SEE DETAIL F ON SHEET C-500. (W=8", HEIGHT VARIES PER PLAN)
 - INSTALL FENCE PER ARCHITECTURAL PLAN A-002.
 - INSTALL GATE PER ARCHITECTURAL PLAN A-002.
 - INSTALL AREA DRAIN OR CLEANOUT PER SP-7.
 - ADJUST TO FINISHED GRADE.
 - TWO WAY COMMUNICATION SYSTEM. SEE ELECTRICAL PLANS FOR DETAIL AND LOCATION.
 - PROTECT EXISTING PLUMBING AND ELECTRICAL ELEMENTS IN PLACE DURING CONSTRUCTION
 - INSTALL VEHICULAR GATE PER ARCHITECTURAL PLAN A-002.
 - CONFORM 6" CURB TO EXISTING CURB.
 - INSTALL YELLOW WARNING SLIP-RESISTANT PAINT FOR STEP APPROACH.
 - INSTALL ROLLING GATER PER ARCHITECTURAL PLAN A-002.
 - INSTALL 1" PVC WATERLINE (SCH-80).
 - INSTALL 1" 90° FITTING.
 - INSTALL 1" 45° FITTING.
 - CONNECT TO EXISTING WATER LINE.
 - INSTALL 1" FLANGED TEE PER SDPWC SDW-122.
 - INSTALL QUICK COUPLING VALVE (1" DIA. SIZE) RAIN BIRD 44-LRC. CONTRACTOR TO PROVIDE 2 KEYS AND 2 PERMANENT HOSE VACUUM BREAKERS TO BE INCLUDED FOR THE CITY'S USE.



EXTEND CONCRETE PEDESTRIAN WALK TO TIE INTO EXISTING CONCRETE PEDESTRIAN WALK. SLOPE IN DIRECTION OF TRAVEL NOT TO EXCEED 4.50%. CROSS SLOPES NOT TO EXCEED 2.0%. IF SLOPES EXCEED THE MAXIMUMS MENTIONED HERE, CONTRACTOR TO CONTACT ENGINEER OF WORK OR CITY ENGINEER.

- NOTES:**
- CONTRACTOR SHALL REPLACE AND REPAIR ALL EXISTING PAVEMENT, STRIPING, TURF AND IRRIGATION DAMAGED DURING CONSTRUCTION. DEVIATIONS FROM THESE SIGNED PLANS WILL NOT BE ALLOWED UNLESS A CONSTRUCTION CHANGE IS APPROVED BY CITY ENGINEER OR A CHANGE IS REQUIRED BY RESIDENT ENGINEER/INSPECTOR.
 - WATER LINE MUST HAVE 18" MINIMUM COVER AND 12" MINIMUM CLEAR AT UTILITY CROSSINGS.
 - FOR ALL CHAIN LINK FENCE FABRIC, SEE ARCHITECTURAL PLANS.

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT

WBS S-17000

APPROVED: DATE: 11/14/2019
FOR CITY ENGINEER: JASON GRANI
PRINT NAME: JASON GRANI
RCE#

11/14/2019
DATE: 11/14/2019
DATE FILMED: 11/14/19

1850-6288
1850-6288
40665-7-D

8/28/2019
CONTRACTOR INSPECTOR

DATE STARTED: 1/24/20
DATE COMPLETED:

REG. NO. 61819
MEGAN R. ULERY
No. 73385
STATE OF CALIFORNIA

6/18/19
DATE: 6/18/19
DATE FILMED: 1/24/20

11/14/2019
DATE: 11/14/2019
DATE FILMED: 11/14/19

1850-6288
1850-6288
40665-7-D

BUD KEARNS AQUATIC COMPLEX IMPROVEMENTS

C-200

POOL EQUIPMENT SCHEDULE

BUD KEARNS AQUATIC COMPLEX

ITEM	MAKE/MODEL	EXISTING (E)/NEW (N)	KEYNOTE
Pump	Aurora Pump, Goulds 188F2S2fO	(E)	5/A-110
Large Filters	EPD Poly Steel Tanks	(N)	26/A-110
Water Softening Filters	Remove	-	-
Main Boiler	LAARS, Mighty Therm	(E)	20/A-002
Secondary Pool Heater	Raypack Hi Delta, 2002C	(N)	12/A-110
Chemical Controller	BECS System 5	(E)	23//A-110
Chlorinator (None)	Walchem Pump - Model EHE46E1-VC	(E)	23/A-110
Acid	Stenner Pump - Model 85M5	(E)	24/A-110
CO ₂	Eko Systems - Model C10-B	(E)	25/A-110

KEYNOTES

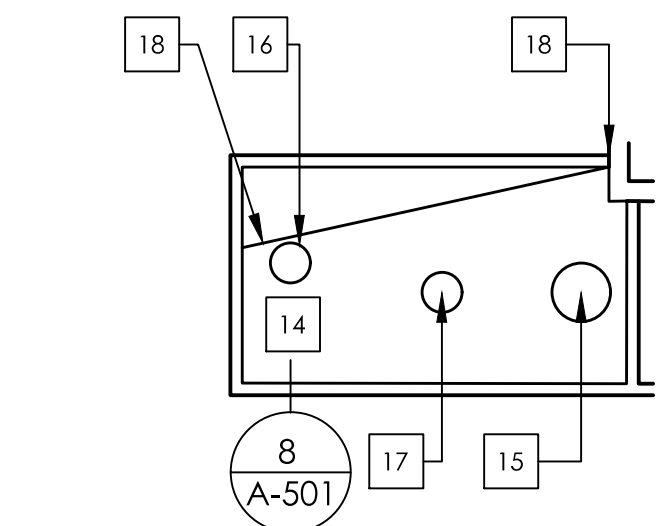
- 1 ACCESSIBLE BENCH SEATING PER 2/A-502
- 2 METAL ACCESS HATCH & LADDER TO UTILITY CRAWL SPACE PER 10/A-502
- 3 DOOR & HARDWARE PER A-600
- 4 HI-LO DRINKING FOUNTAIN PER 3/P-110
- 5 (E) PUMP AND MOTOR, MOUNTED ON CONC. PAD SEE 3/S-501
- 6 SURGE CHAMBER PER 2/SP-8
- 7 CONC. SLAB PER S-101
- 8 PATCH CONC. SLAB PER 10/S-002
- 9 (E) ELECTRICAL PANELS TO REMAIN
- 10 CONC. EQUIPMENT PAD PER S-101
- 11 SURGE CHAMBER ACCESS HATCH PER 1/SP-8
- 12 NEW SECONDARY POOL HEATER, SEE 17/SP-3
- 13 (E) BRICK CHIMNEY FLUE TO REMAIN UNDAMAGED
- 14 MODIFIED BITUMEN ROOFING PER SPECIFICATION 075216
- 15 EXHAUST VENT PER 4/A-501, SEE P-110
- 16 INTAKE AIR PIPE PER 4/A-501, SEE P-110
- 17 (E) EXHAUST VENT
- 18 (E) CRICKET AND ROOF SCUPPER TO REMAIN
- 19 (E) BACK WASH TANK TO REMAIN
- 20 GUARDRAIL PER 1/S-502
- 21 LADDER PER 8/A-502
- 22 (E) BENCH SEATING
- 23 REPLACE (E) CHLORINE INCL. ALL REQ. PUMP CONNECTIONS, CONSTRUCT 6"x6" (WxH) CONCRETE CURB TO SURROUND TANK
- 24 (E) ACID TANK(S) RAISED 6" OFF GROUND
- 25 (E) CARBON DIOXIDE TANK(S)
- 26 INSTALL (3) FILTERS, SEE POOL EQUIPMENT SCHEDULE
- 27 REPLACE FLOOR DRAIN PER MECHANICAL
- 28 (E) HOSE BIBB TO REMAIN
- 29 (E) BACKFLOW FOR POOL ONLY, PARALLEL TO GUARDRAIL.

GENERAL NOTES

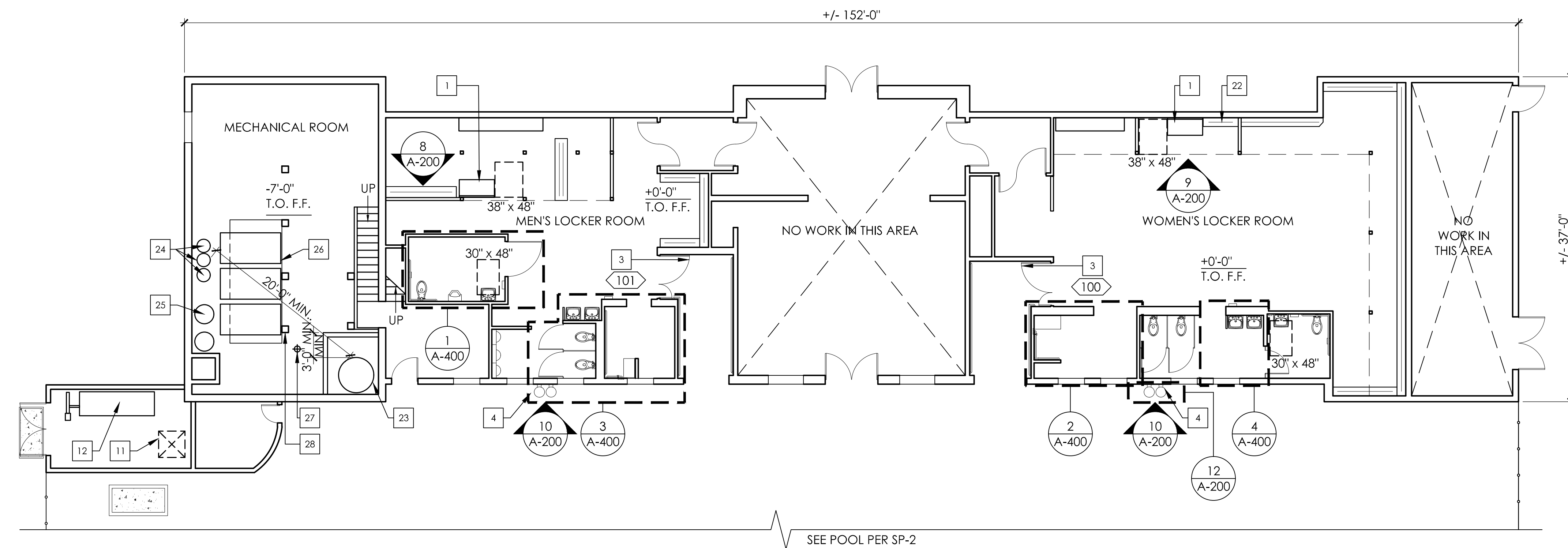
1. ALL WALLS, FLOORS, CEILINGS, FINISHES & FIXTURES EXISTING TO REMAIN, UNO.

LEGEND

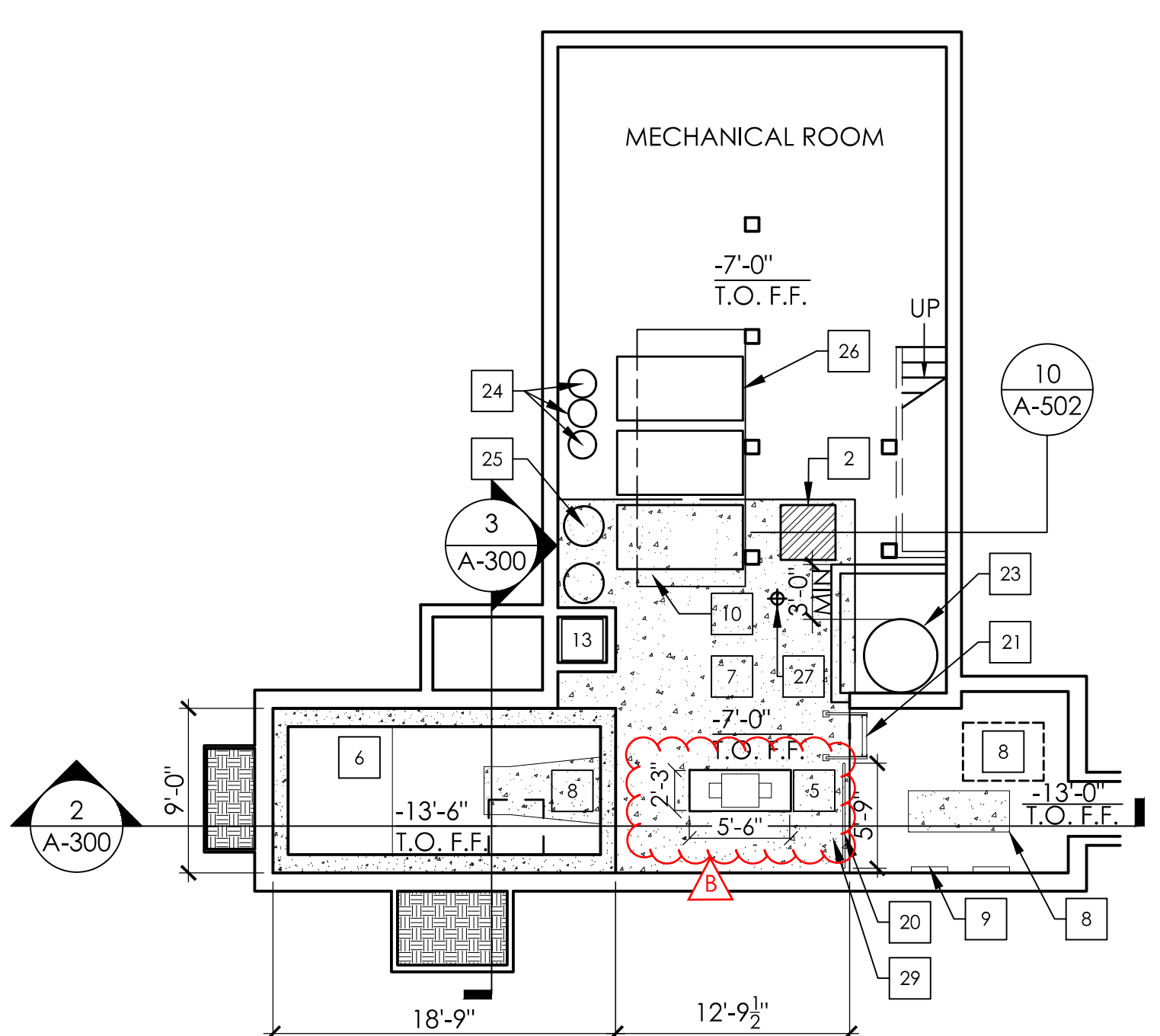
- (E) WALL
- CONC. WALL



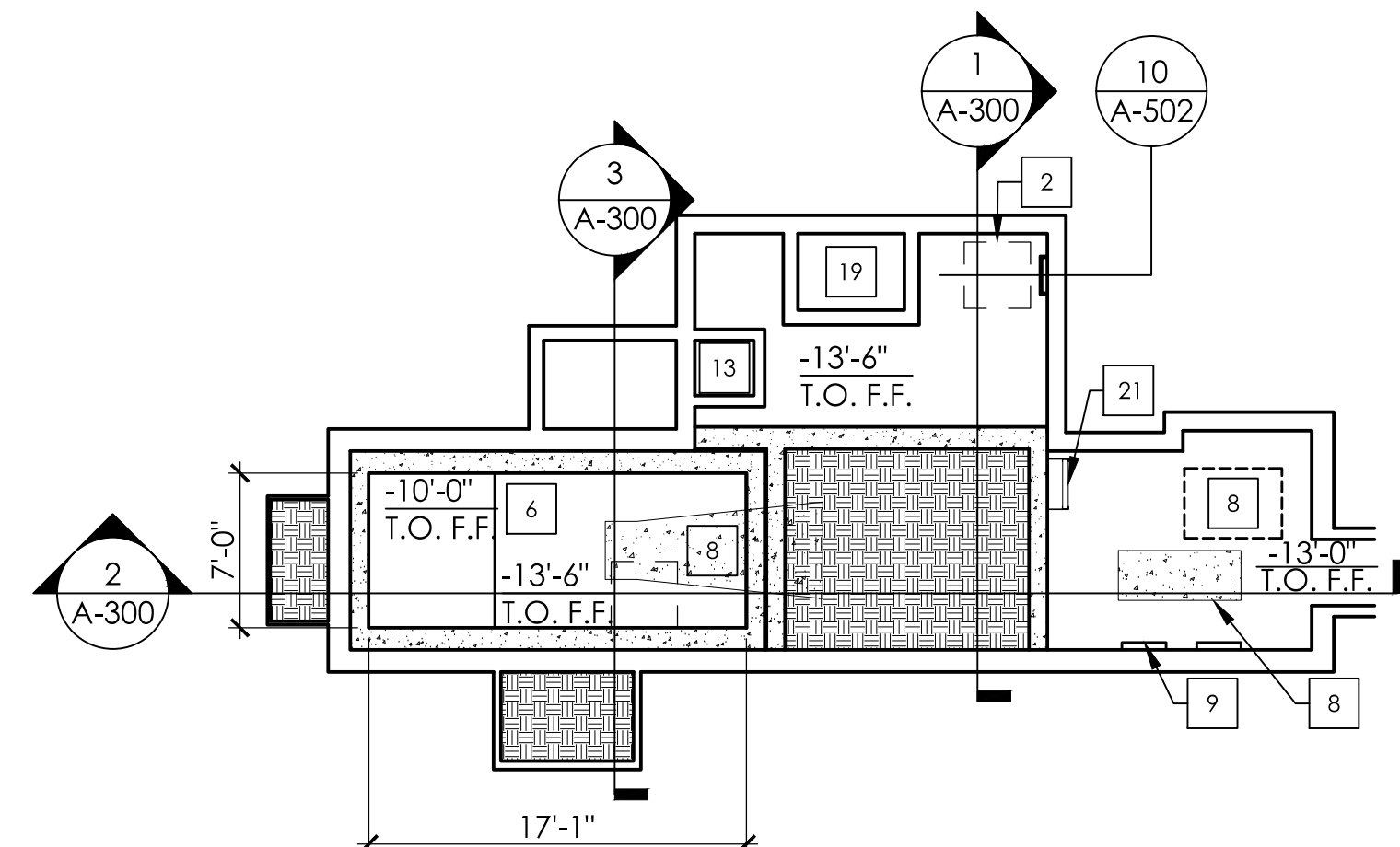
4 ROOF LEVEL
1/8" = 1'-0"



3 FIRST LEVEL
1/8" = 1'-0"



2 LOWER LEVEL 1
1/8" = 1'-0"



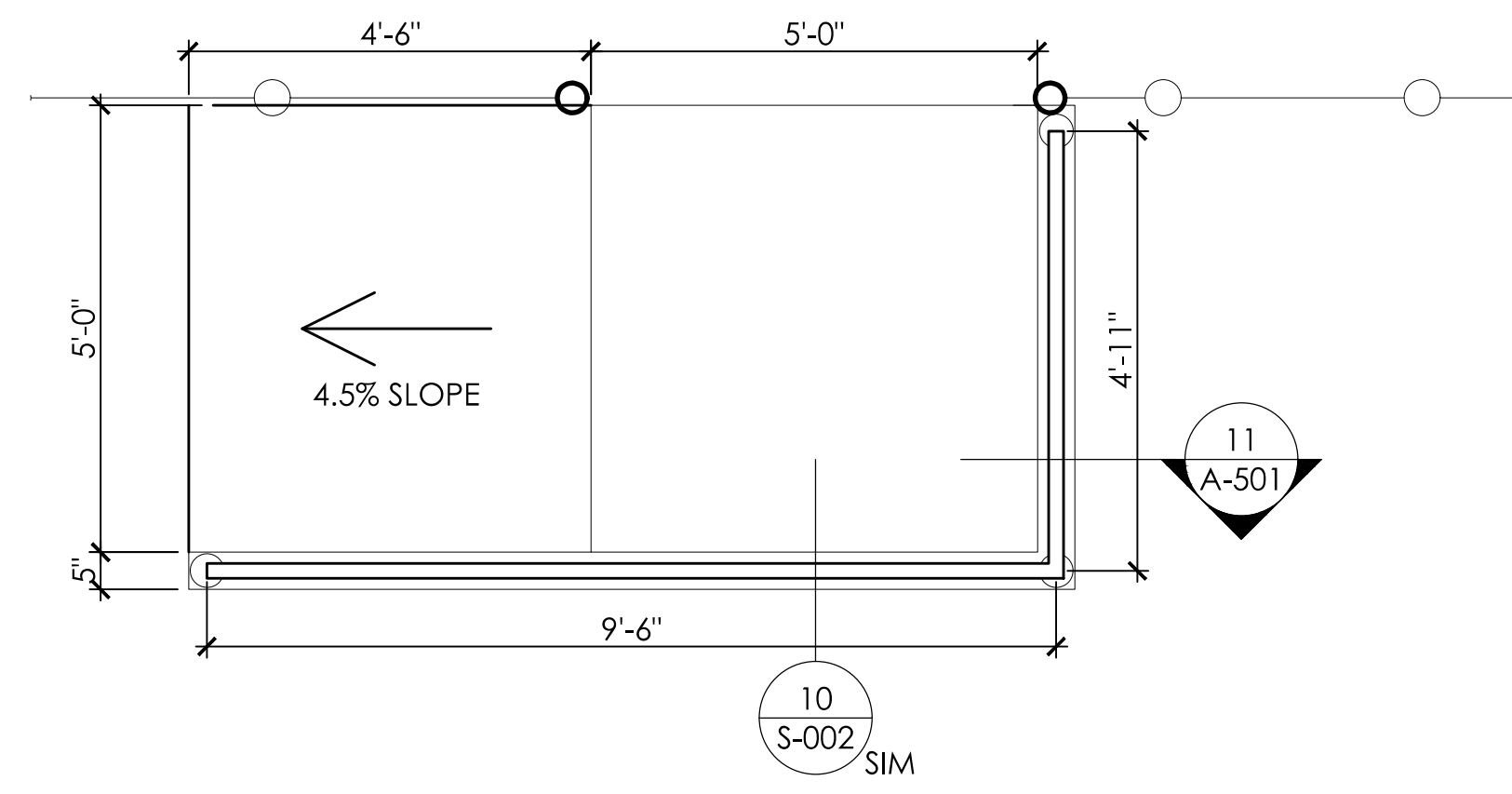
1 LOWER LEVEL 2
1/8" = 1'-0"

BUD KEARNS AQUATIC COMPLEX IMPROVEMENTS

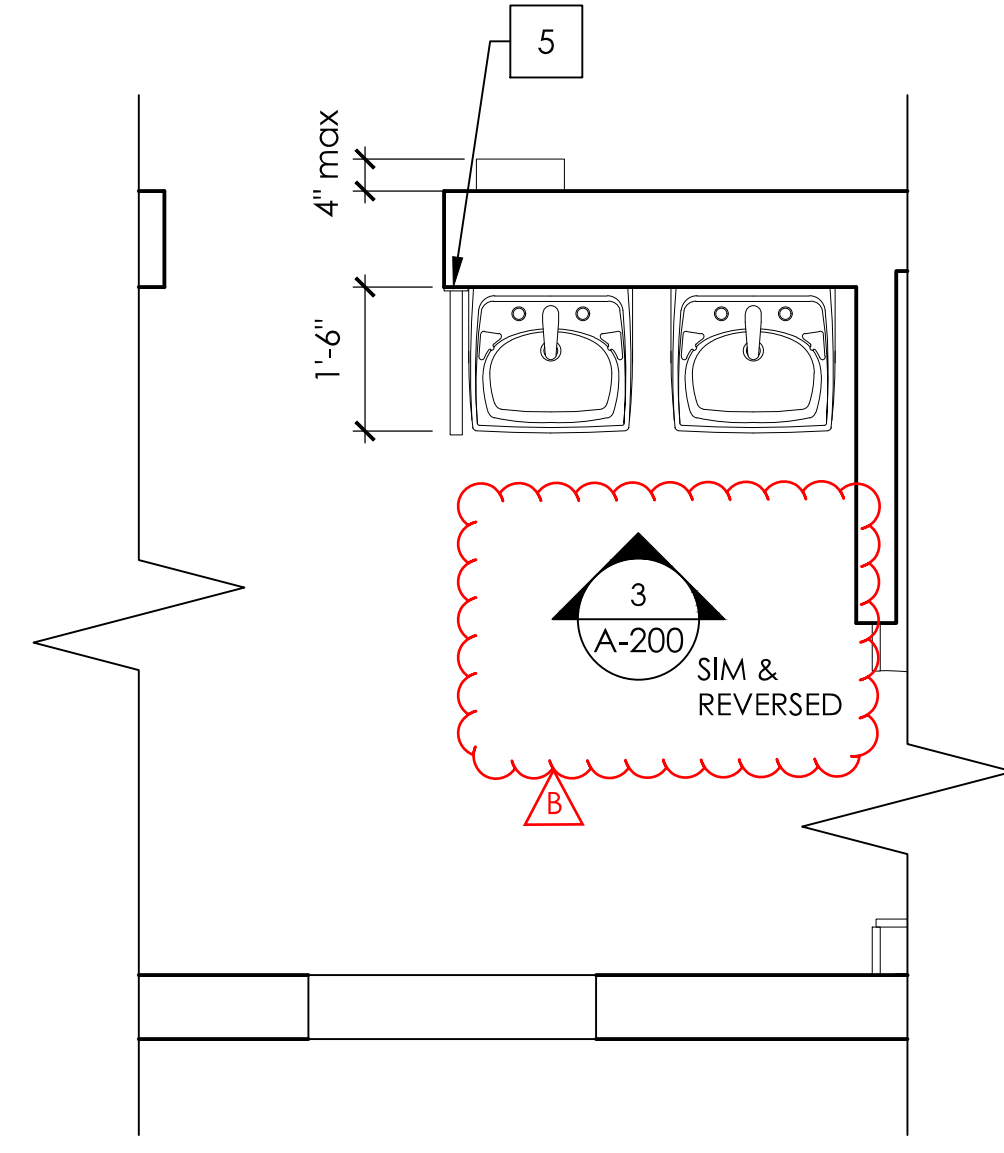
A-110

BUD KEARNS AQUATIC COMPLEX IMPROVEMENTS
CONSTRUCTION FLOOR PLANS

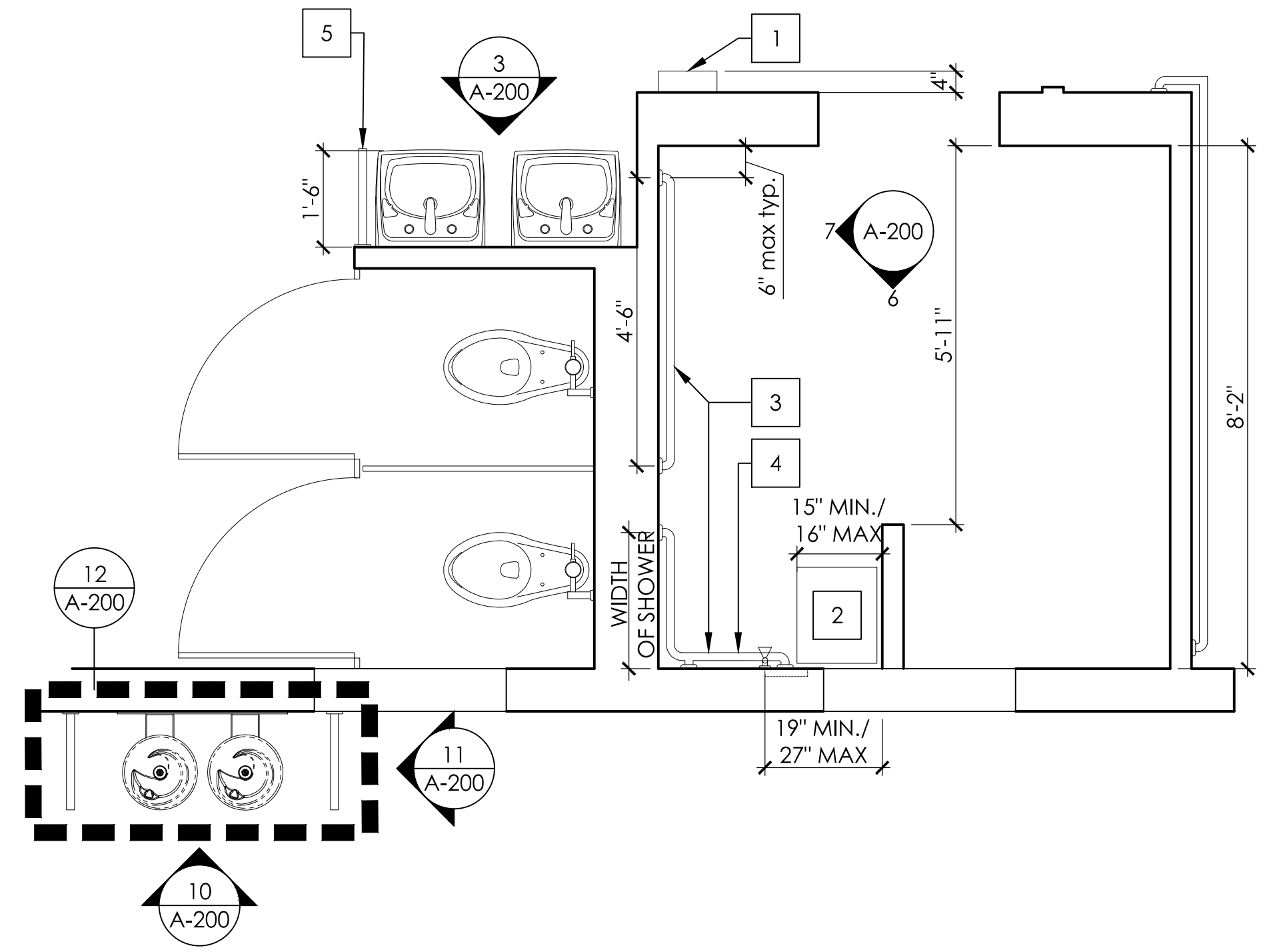
SPEC. NO.: 1815A		CITY OF SAN DIEGO, CALIFORNIA PUBLIC WORKS DEPARTMENT		WBS S - 17000	
APPROVED:		11/14/2019		SUBMITTED BY: MICHELLE GARCIA-QUILICO	
FOR CITY ENGINEER: JASON GRANI		DATE: 11/14/19		PROJECT MANAGER	
PRINT NAME: JASON GRANI		RCE#: C77208		CHECKED BY: DAVID SENAH	
DESCRIPTION		BY	APPROVED	DATE	FILMED
ORIGINAL	PWA			11/14/19	
ADDENDUM B	PWA			1/24/20	
CONTRACTOR INSPECTOR		DATE STARTED		40665 - 17 - D	
		DATE COMPLETED		Page 16 of 21	



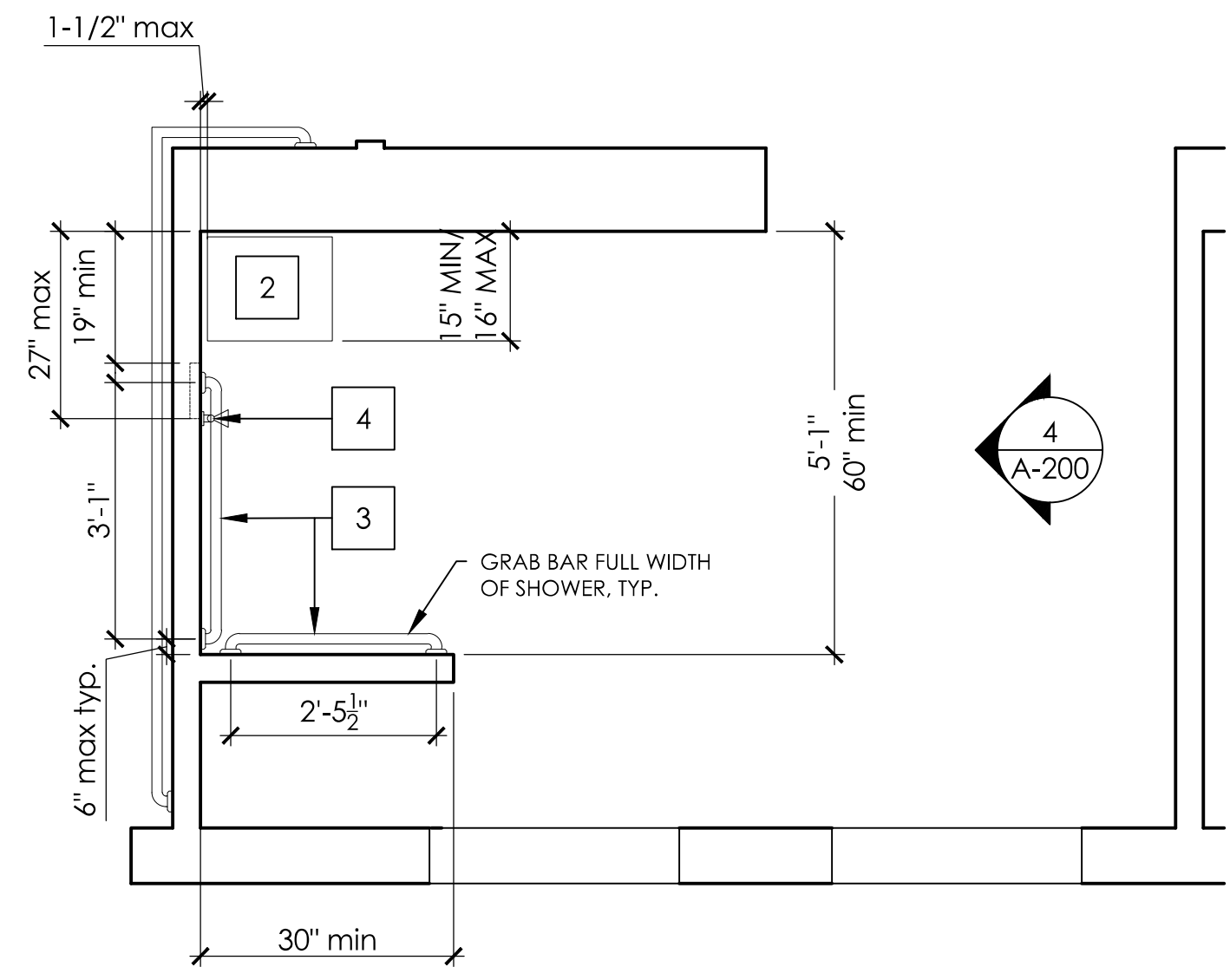
5 ENLARGED PLAN - SUN DECK RAMP
1/2" = 1'-0"



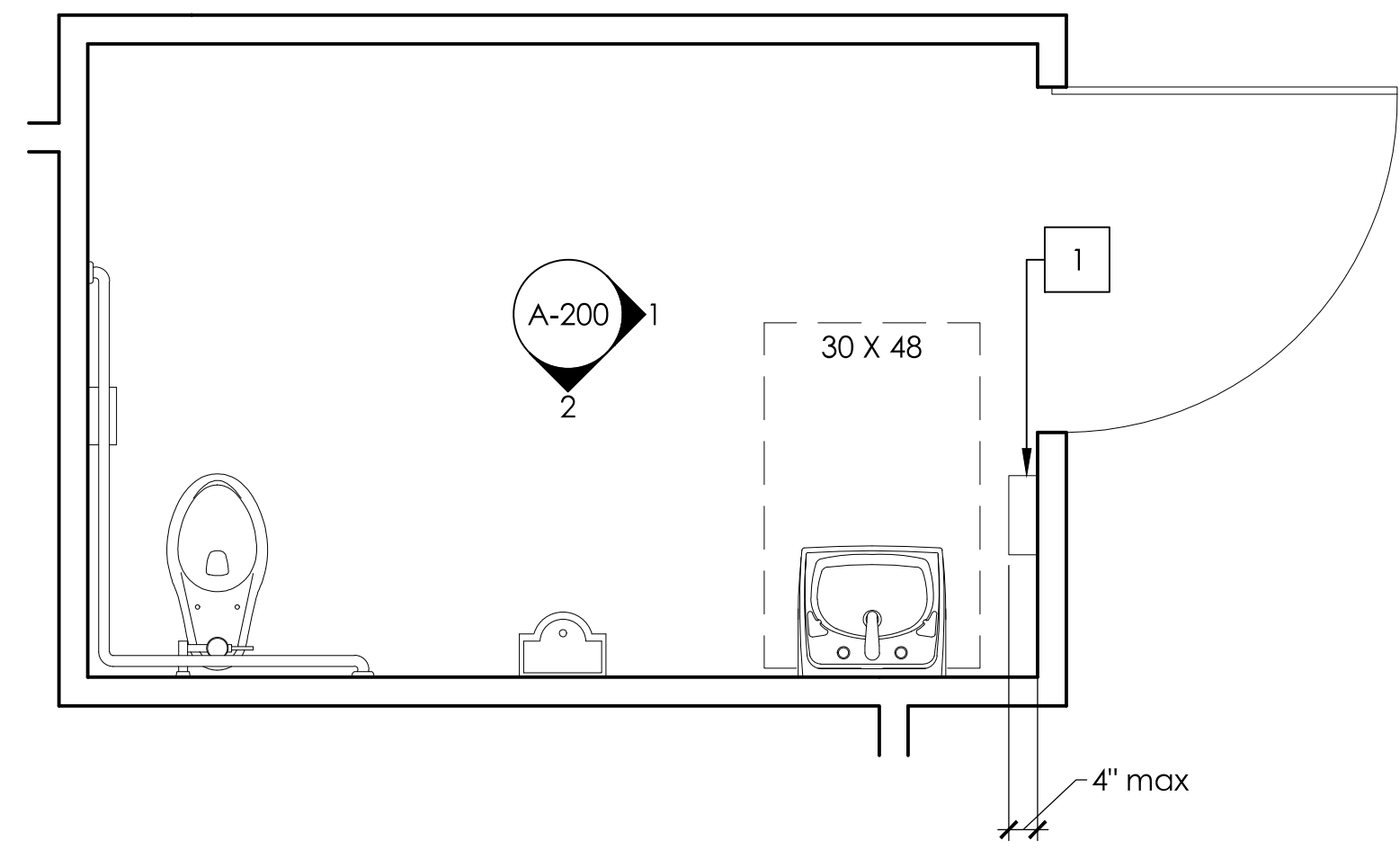
4 LAVATORY ENLARGED PLAN - WOMEN'S LOCKER ROOM
1/2" = 1'-0"



3 SHOWER ROOM ENLARGED PLAN - MEN'S LOCKER ROOM
1/2" = 1'-0"

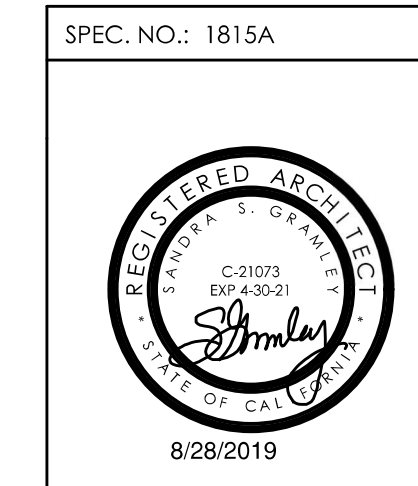
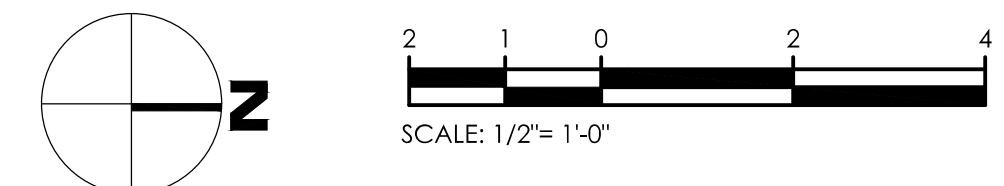


2 SHOWER ROOM ENLARGED PLAN - WOMEN'S LOCKER ROOM
1/2" = 1'-0"

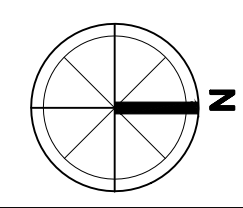
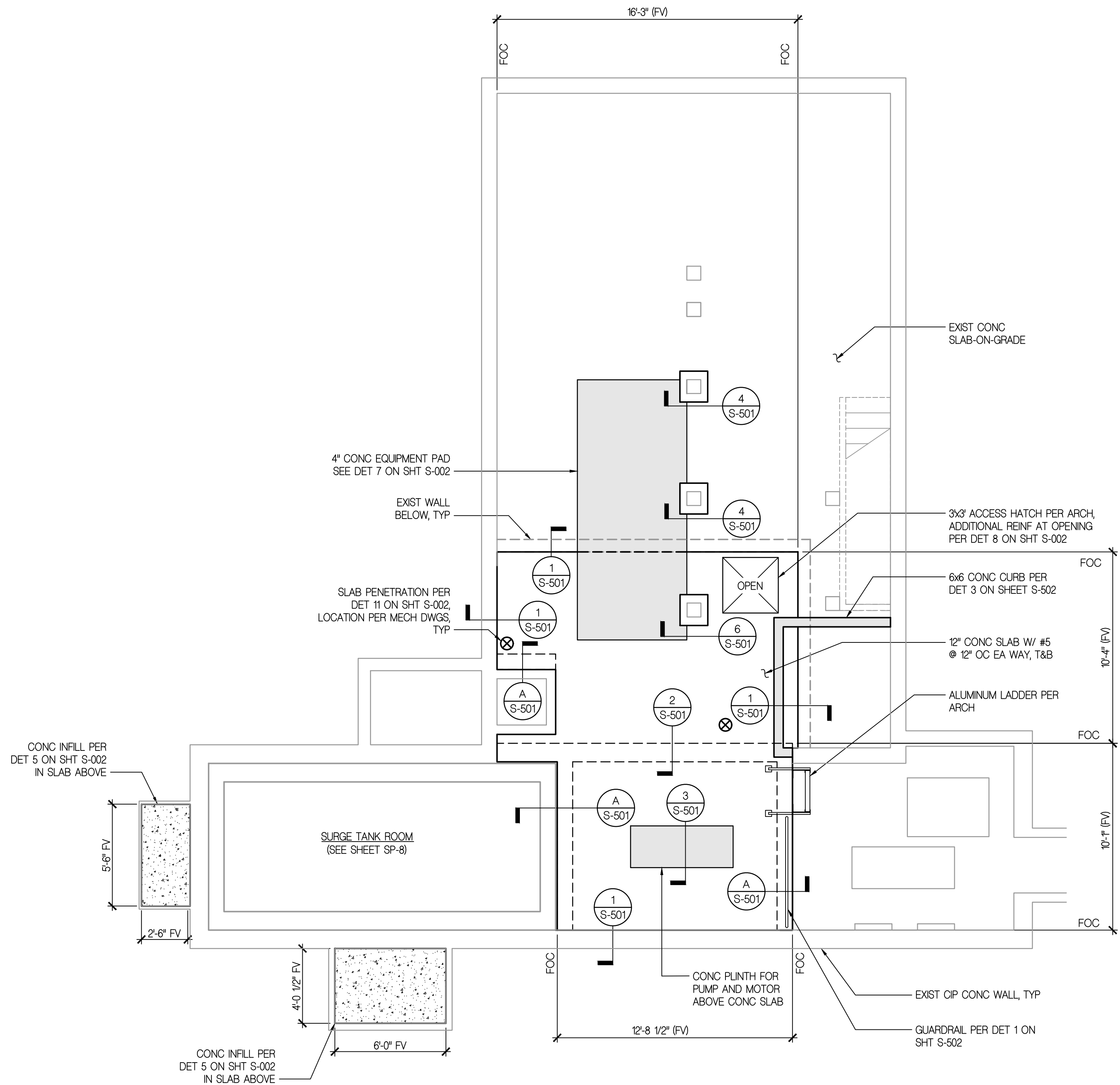


1 ACCESSIBLE RESTROOM - MEN'S LOCKER ROOM
1/2" = 1'-0"

- KEYNOTES**
- 1 HAND DRYER, PER SPECIFICATION
 - 2 SHOWER SEAT PER 6/A-502
 - 3 GRAB BAR PER SPECIFICATION 102800, PROVIDE BACKING PER 9/S-002
 - 4 ACCESSIBLE HAND HELD SHOWER HEAD BRACKET PER 5/A-502
 - 5 CANE DETECTION PER 1/A-502
- GENERAL NOTES**
1. ALL WALLS, FLOORS, CEILINGS, FINISHES AND FIXTURES EXISTING TO REMAIN, UON.
- LEGEND**
- (E) WALL

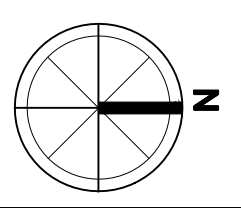
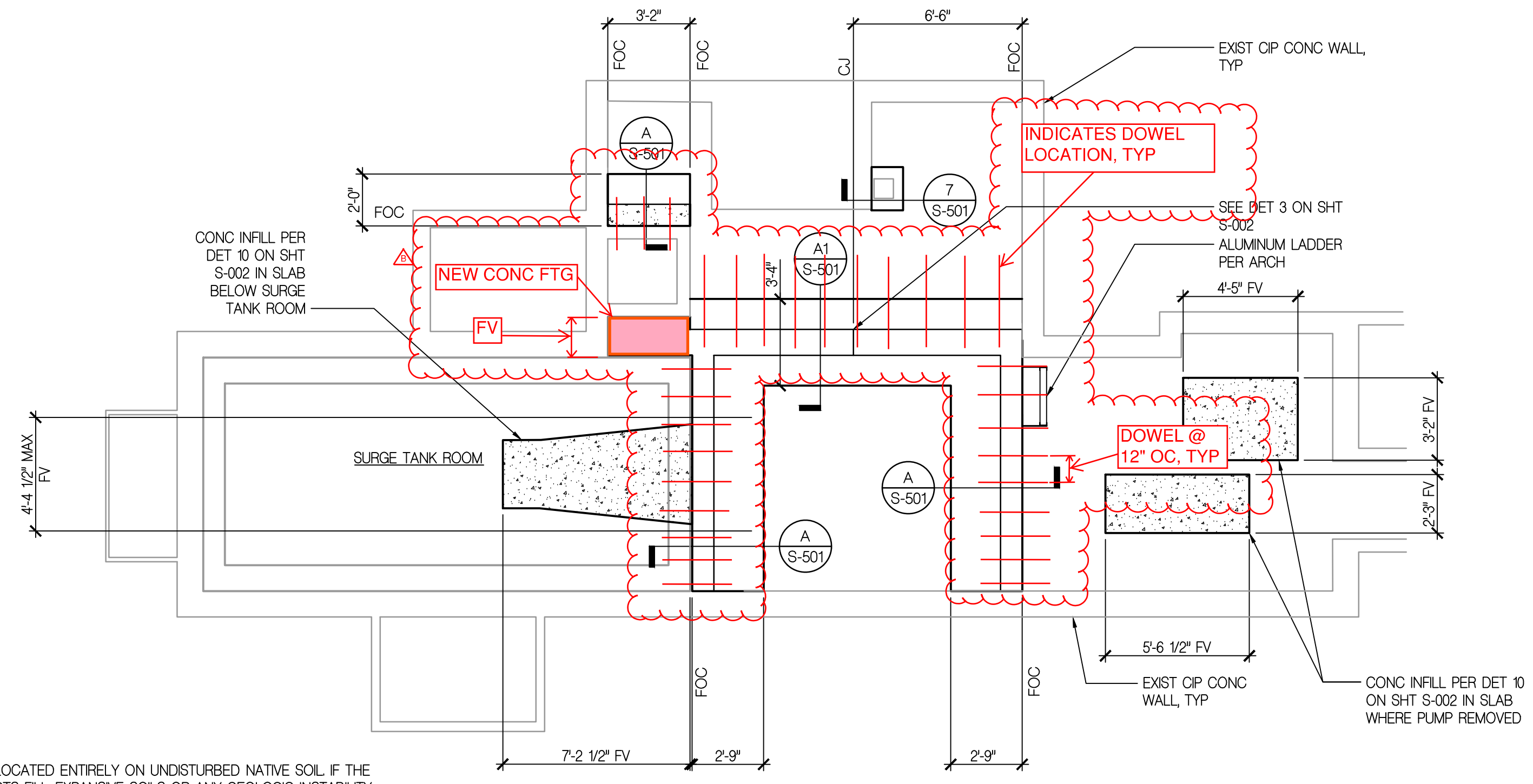


SPEC. NO.: 1815A		CITY OF SAN DIEGO, CALIFORNIA PUBLIC WORKS DEPARTMENT 20 out of 54		WBSP - S - 17000
APPROVED:	DATE: 11/14/2019	SUBMITTED BY: MICHELLE GARCIA-QUILICO		
FOR CITY ENGINEER: JASON GRANI	DATE: C77208	PROJECT MANAGER		
PRINT NAME:	RCE#:	CHECKED BY: DAVID SENAH		
PROJECT ENGINEER		PROJECT ENGINEER		
DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PWA		11/14/19	
ADDENDUM B	PWA		1/24/20	
CONTRACTOR	DATE STARTED	COORDINATE		
INSPECTOR	DATE COMPLETED	CCS27 COORDINATE		
		CCS83 COORDINATE		
		1850-6288		
		40665 - 20 - D		



LOWER LEVEL 1 FLOOR PLAN

SCALE: 1/4" = 1'-0"



LOWER LEVEL 2 FOUNDATION PLAN

SCALE: 1/4" = 1'-0"

NOTE:
THE STRUCTURE(S) WILL BE LOCATED ENTIRELY ON UNDISTURBED NATIVE SOIL IF THE BUILDING INSPECTOR SUSPECTS FILL, EXPANSIVE SOILS OR ANY GEOLOGIC INSTABILITY BASED UPON OBSERVATION OF THE FOUNDATION EXCAVATION, A SOILS OR GEOLOGICAL REPORT, AND RESUBMITTAL OF PLANS TO PLAN CHECK TO VERIFY THAT THE REPORT RECOMMENDATIONS HAVE BEEN INCORPORATED, MAY BE REQUIRED.

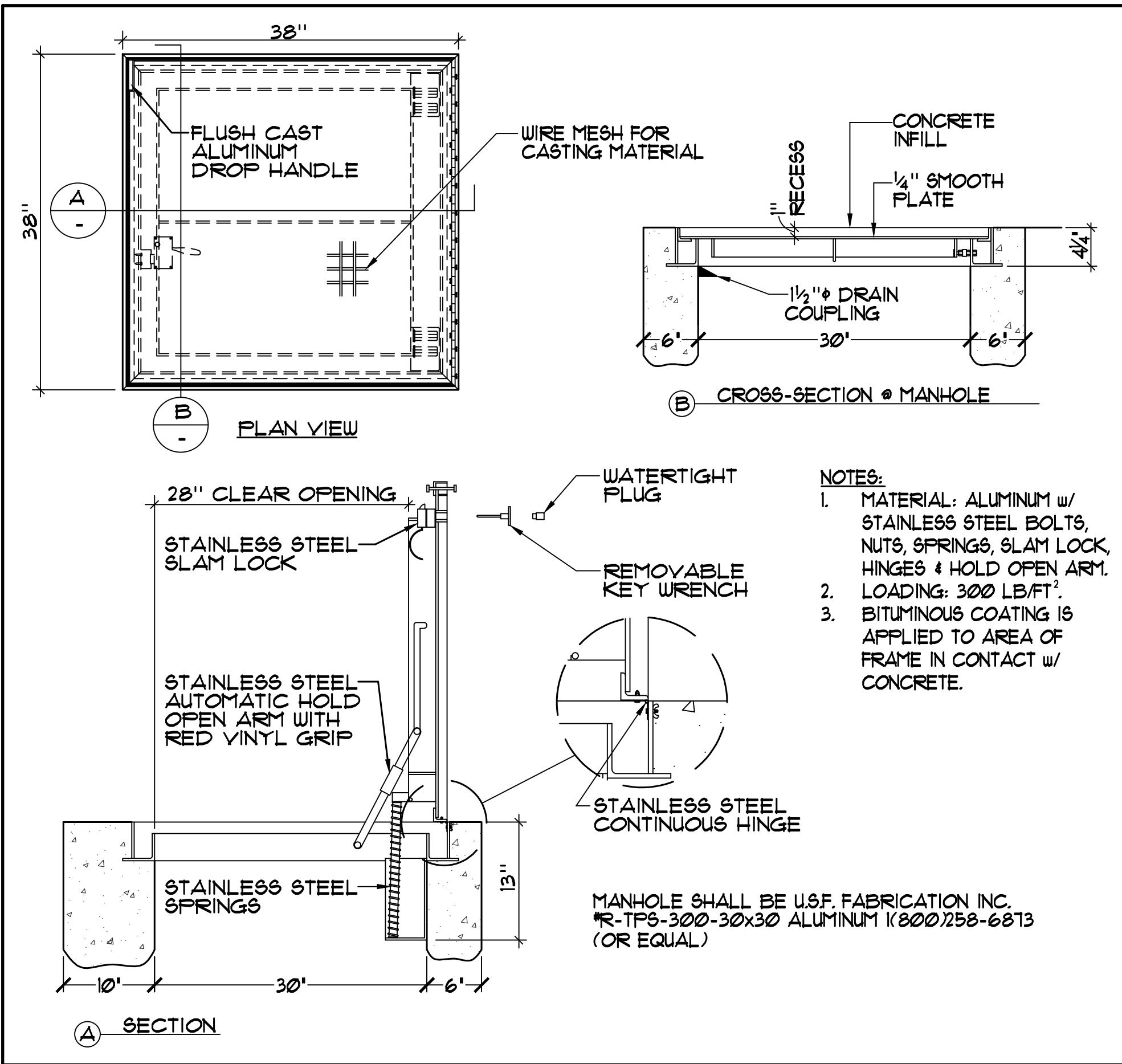
SIGNATURE *Mark S Van Biber* STRUCTURAL ENGINEER OF RECORD

S-101

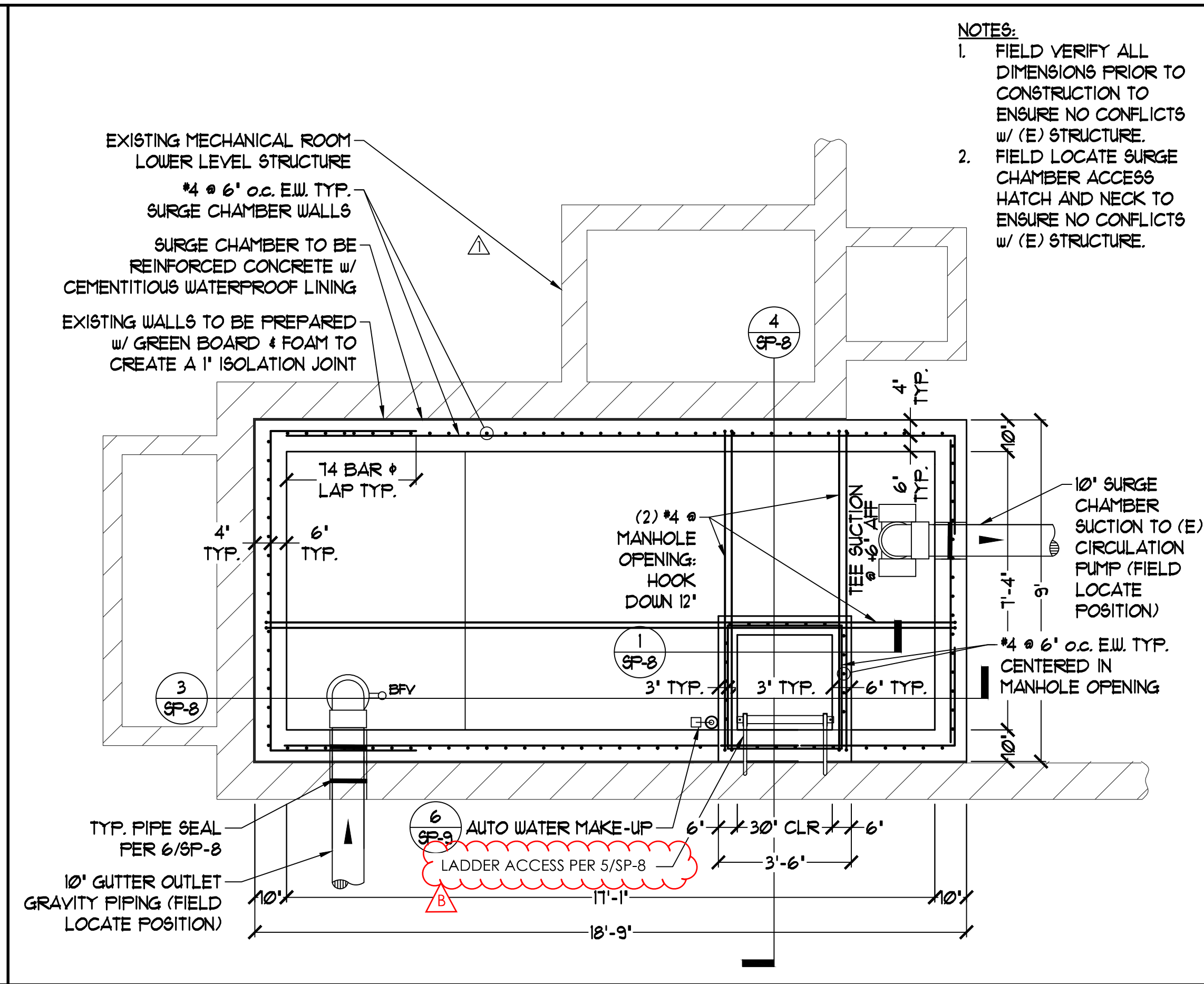
BUD KEARNS AQUATIC COMPLEX IMPROVEMENTS
STRUCTURAL PLANS

	SPEC. NO.: 1815A CITY OF SAN DIEGO, CALIFORNIA PUBLIC WORKS DEPARTMENT 27 out of 54 APPROVED: <i>[Signature]</i> FOR CITY ENGINEER: JASON GRANI DATE: 11/14/2019 PRINT NAME: JASON GRANI RCE#: C77208	WBS: S - 17000 SUBMITTED BY: MICHELLE GARCIA-QUILICO PROJECT MANAGER CHECKED BY: DAVID SENAH PROJECT ENGINEER
DATE OF SIGNATURE: 8/27/2019 CONTRACTOR INSPECTOR: _____	DESCRIPTION: ADDENDUM B BY: PWA APPROVED: <i>[Signature]</i> DATE: 1/24/20 FILMED: _____	CCS27 COORDINATE: 1850-6288 CCS83 COORDINATE: 40665 - 27 - D

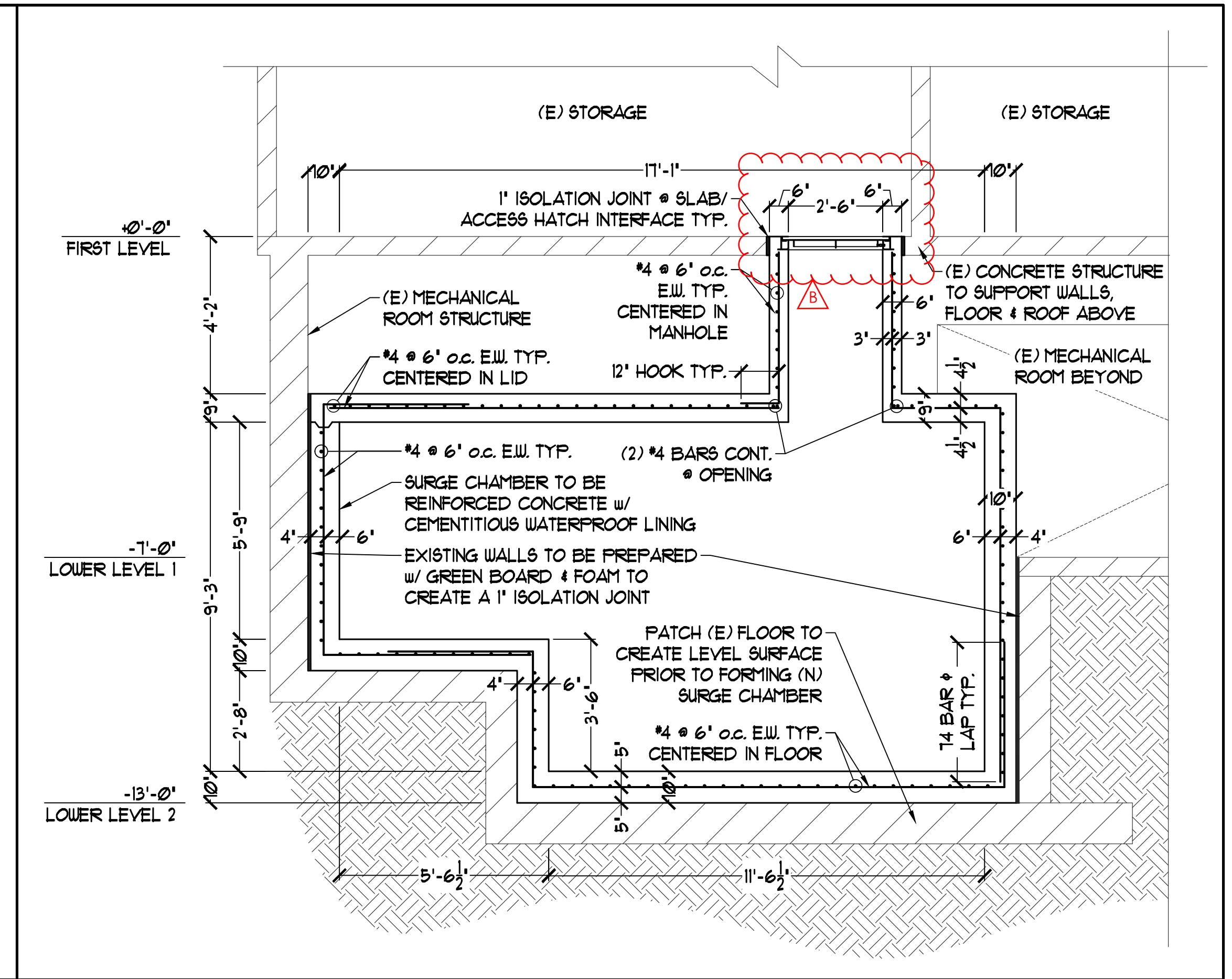
BUD KEARNS AQUATIC COMPLEX IMPROVEMENTS



① SURGE CHAMBER MANHOLE DETAIL



② SURGE CHAMBER PLAN VIEW

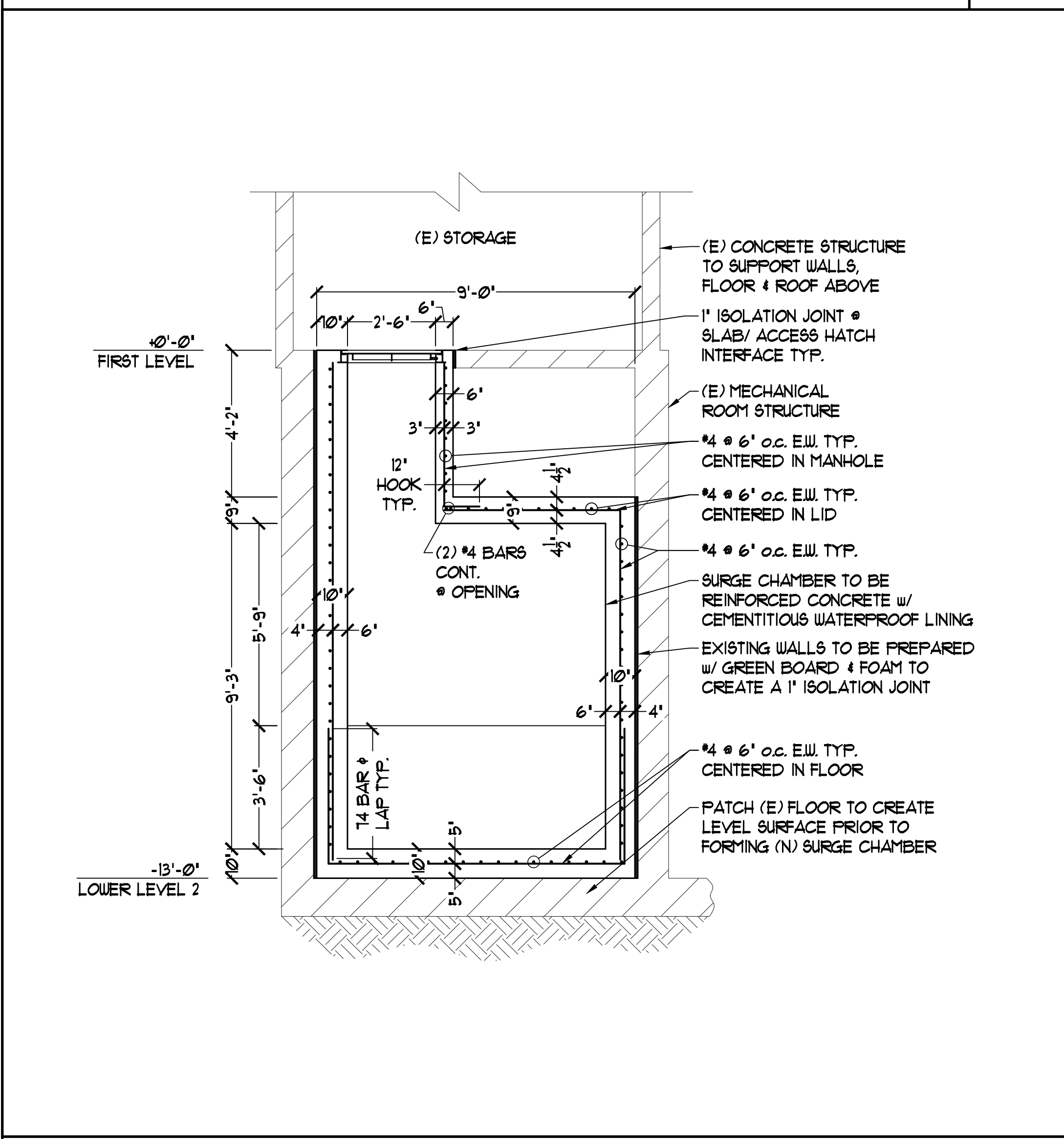


③ SURGE CHAMBER SECTION

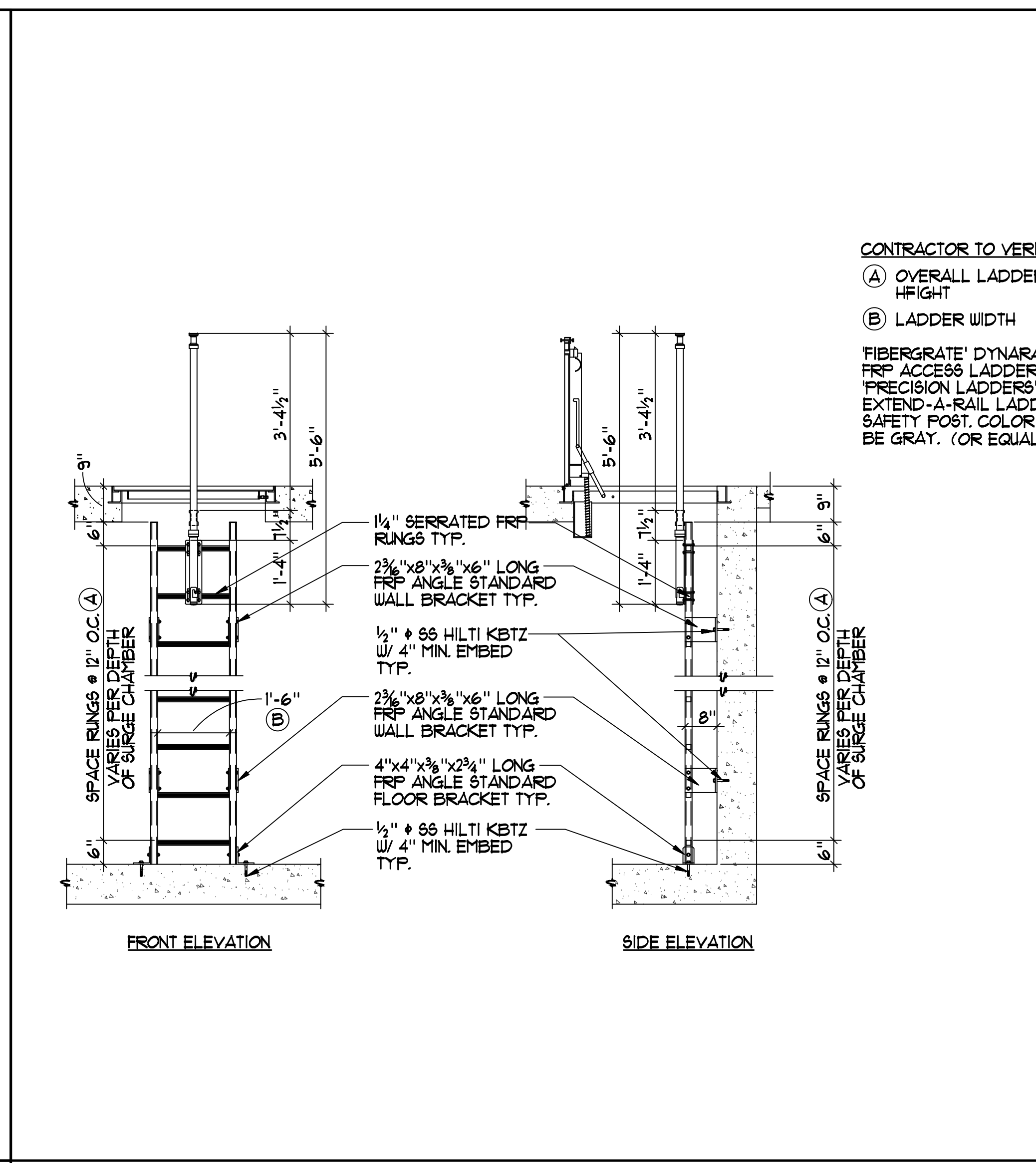
NOTES:
 1. FIELD VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION TO ENSURE NO CONFLICTS w/ (E) STRUCTURE.
 2. FIELD LOCATE SURGE CHAMBER ACCESS HATCH AND NECK TO ENSURE NO CONFLICTS w/ (E) STRUCTURE.

NOTES:
 1. MATERIAL: ALUMINUM w/ STAINLESS STEEL BOLTS, NUTS, SPRINGS, SLAM LOCK, HINGES & HOLD OPEN ARM.
 2. LOADING: 300 LB/FT.²
 3. BITUMINOUS COATING IS APPLIED TO AREA OF FRAME IN CONTACT w/ CONCRETE.

MANHOLE SHALL BE U.S.F. FABRICATION INC. R-TFS-300-30x30 ALUMINUM (800)258-6873 (OR EQUAL)

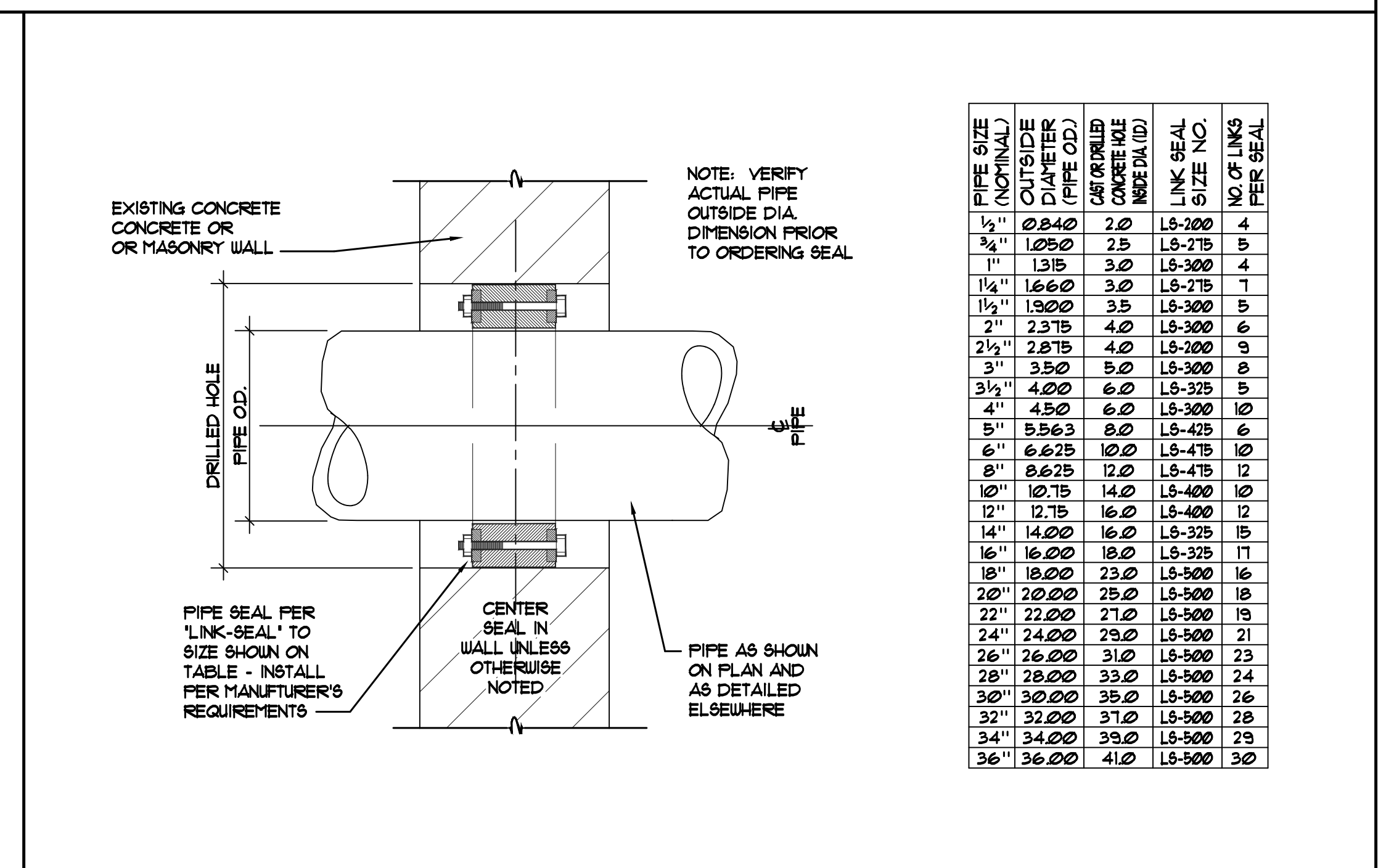


④ SURGE CHAMBER SECTION



⑤ SURGE CHAMBER ACCESS LADDER

CONTRACTOR TO VERIFY:
 (A) OVERALL LADDER HEIGHT
 (B) LADDER WIDTH
 FIBERGLASS DYNARAIL FRP ACCESS LADDER WITH PRECISION LADDERS' EXTEND-A-RAIL LADDER SAFETY POST, COLOR TO BE GRAY. (OR EQUAL)



⑥ PIPE SEAL DETAIL

BUD KEARNS AQUATIC COMPLEX IMPROVEMENTS
 MISCELLANEOUS DETAILS

SPEC. NO.: 1815A

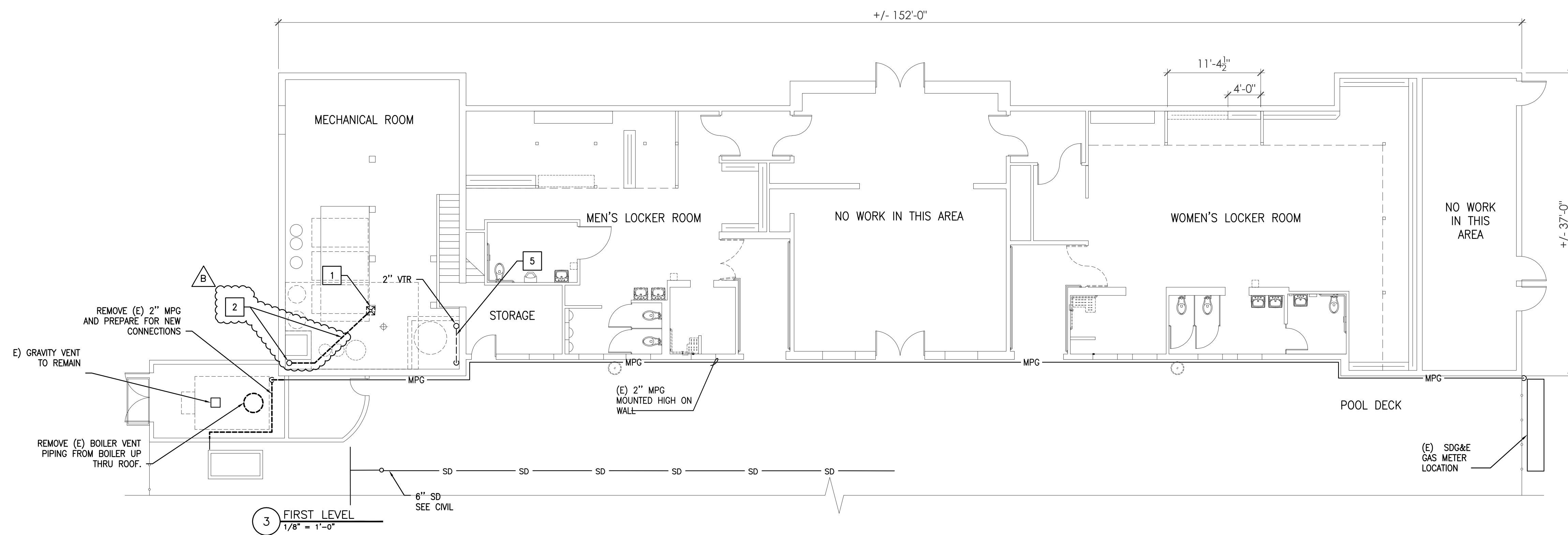
CITY OF SAN DIEGO, CALIFORNIA
 PUBLIC WORKS DEPARTMENT
 37 out of 54

DATE: 11/14/2019
 PROJECT MANAGER: MICHELLE GARCIA-QUILICO
 PROJECT ENGINEER: DAVID SEMAH

CONTRACTOR: INSPECTOR

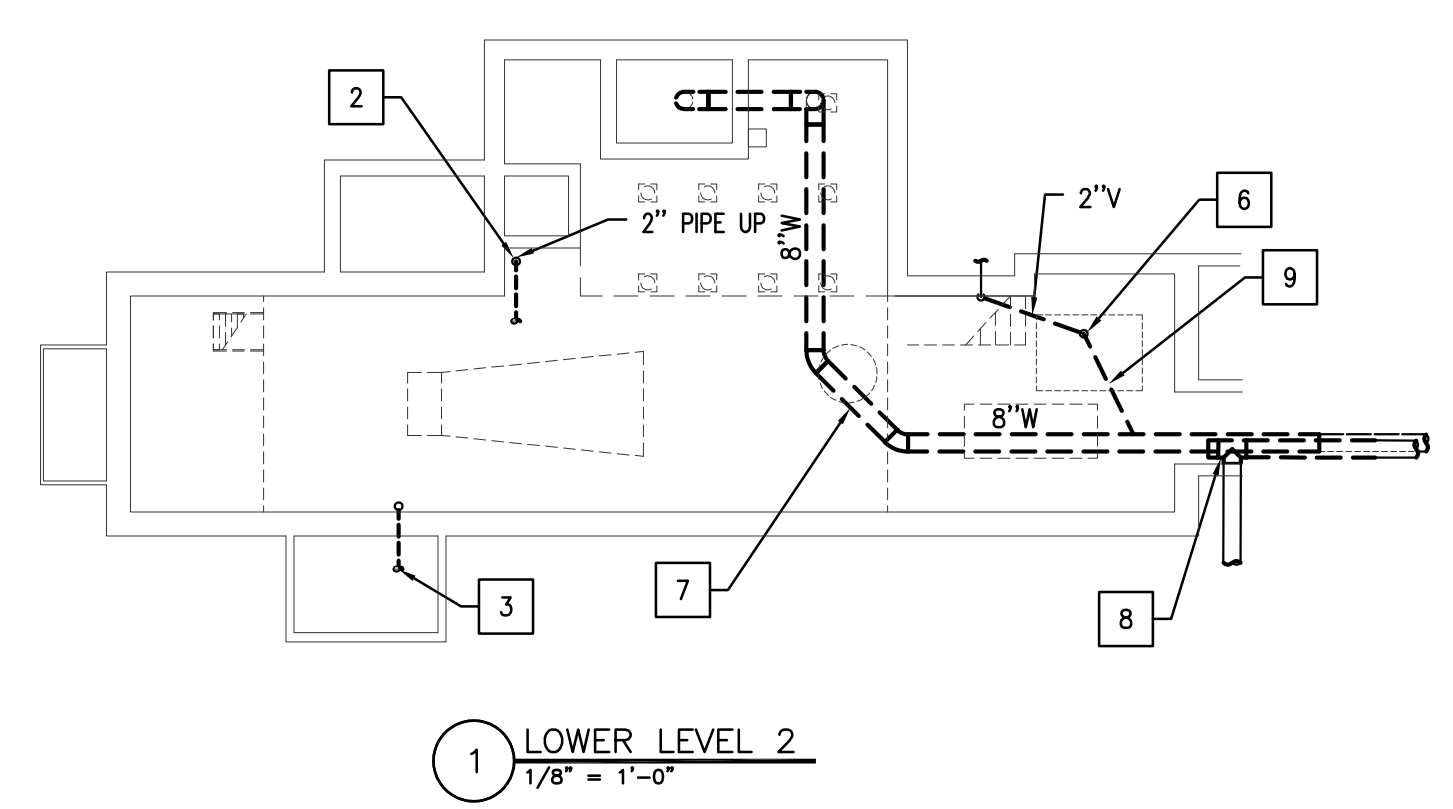
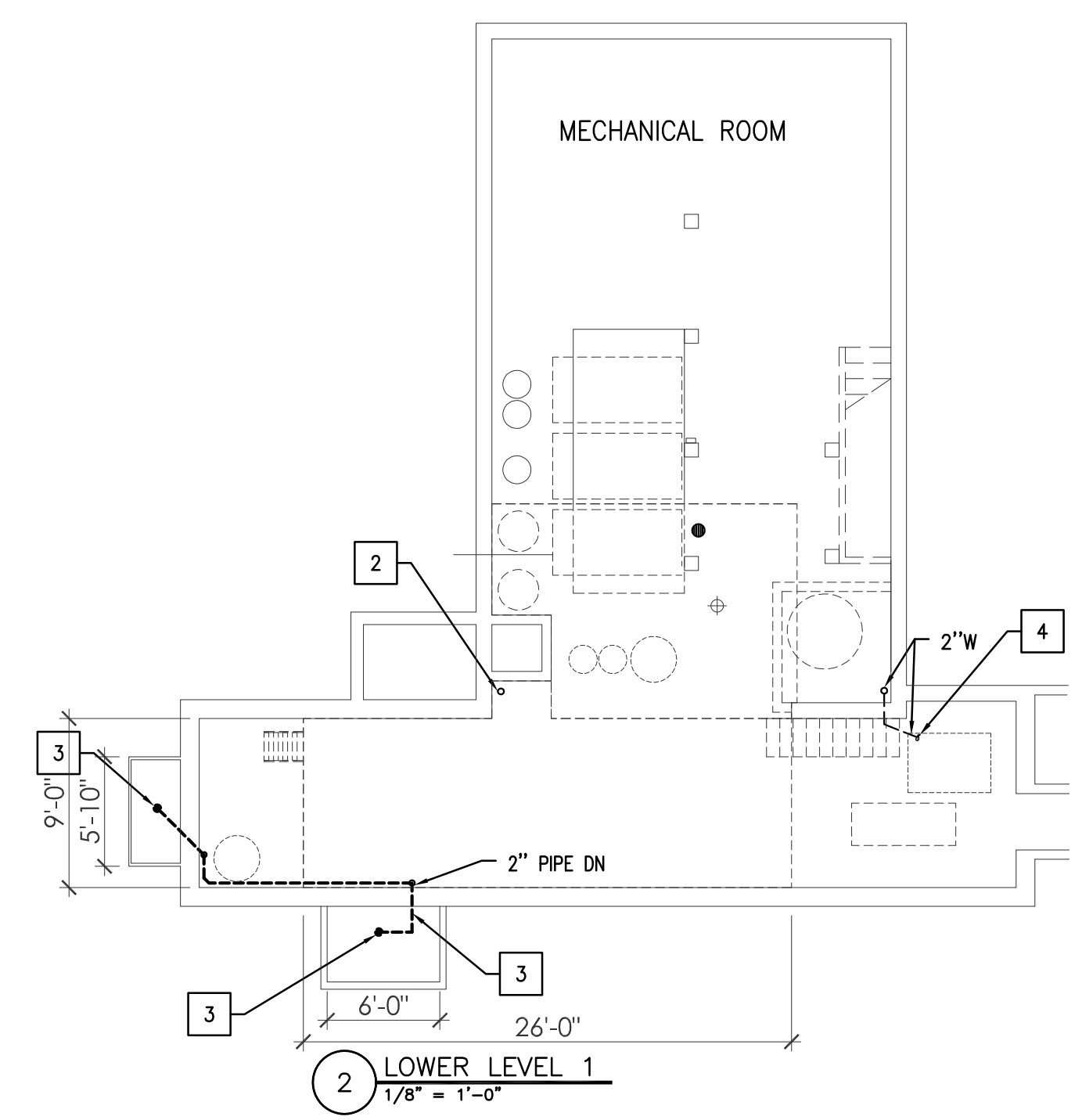
DATE STARTED: 11/14/19
 DATE COMPLETED: 1/24/20

40665 - 37 - D




KEYNOTES

- 1 2" PIPE TO EXISTING ROOF DRAIN.
- 2 REMOVE EXIST. STORM DRAIN FROM ROOF DRAIN DOWN TO LOWER LEVEL AND TO OUTSIDE OF BUILDING. CAP PIPING OUTSIDE OF BUILDING.
- 3 REMOVE EXIST. 2" STORM DRAIN PIPE FROM AREA DRAINS IN LIGHT WELLS ON OUTSIDE OF BUILDING. DRAINS CONNECT TOGETHER ON MID LEVEL AND DROP BELOW SLAB ON LOWER LEVEL. REMOVE PIPING TO STORM DRAIN SYSTEM SERVING POOL DECK. CAP PIPING OUTSIDE OF BUILDING FOOTPRINT.
- 4 2" WASTE PIPING.
- 5 2" W PIPING FROM EXISTING SINK. VENT FROM SINK CONNECTS TO VENT RISING FROM MECHANICAL ROOM FLOOR AND UP THRU ROOF.
- 6 REMOVE EXIST. 2" WASTE ABOVE FLOOR AND 4" WASTE BELOW FLOOR LEVEL. REMOVE CONCRETE AND REMOVE ALL PIPE BELOW FLOOR.
- 7 REMOVE EXIST. 8" WASTE BELOW GROUND.
- 8 REMOVE EXIST. 8" WASTE ABOVE GRADE AND CAP PIPE AT WALL PENETRATION.
- 9 REMOVE EXIST. 4" WASTE.



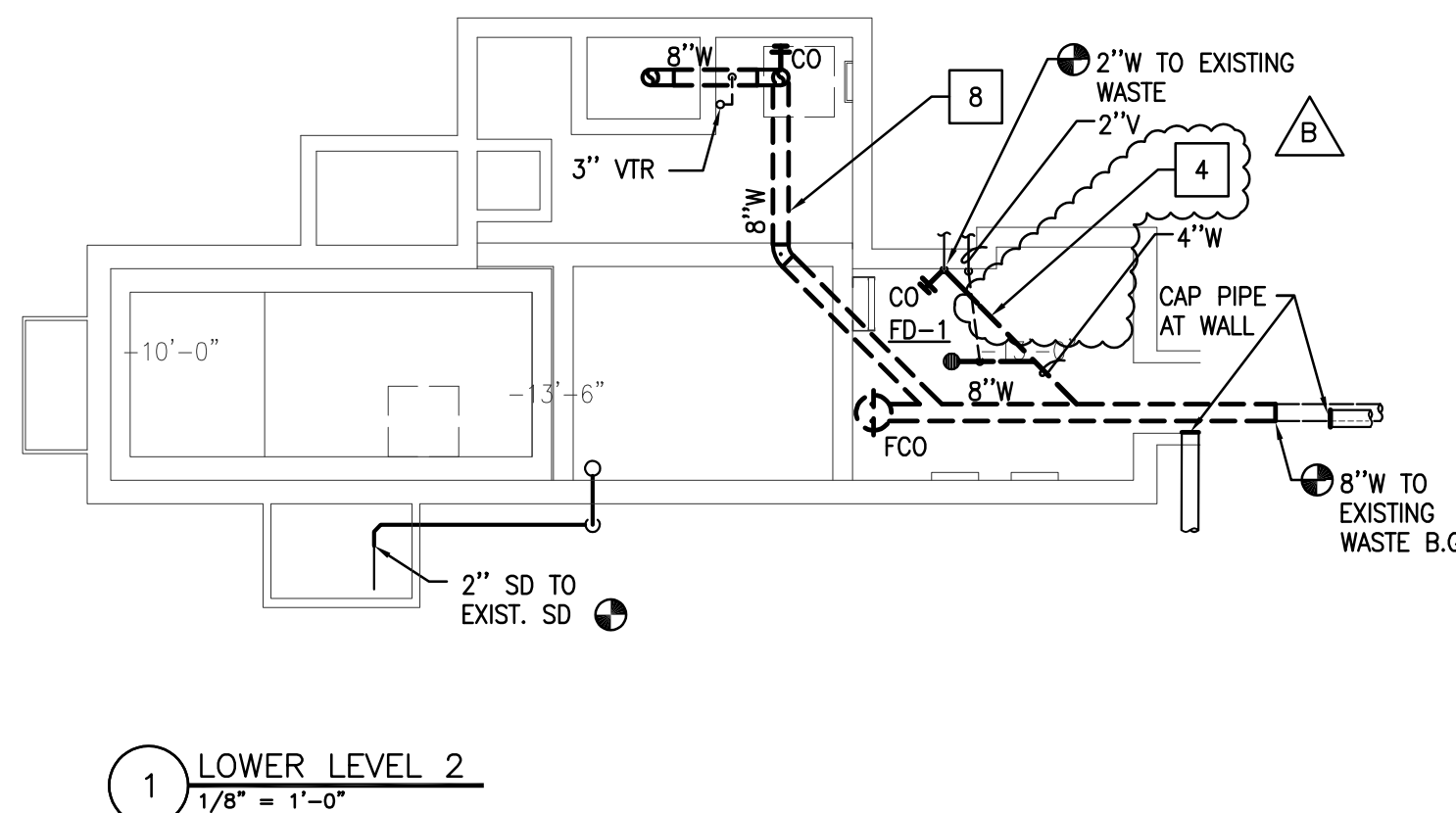
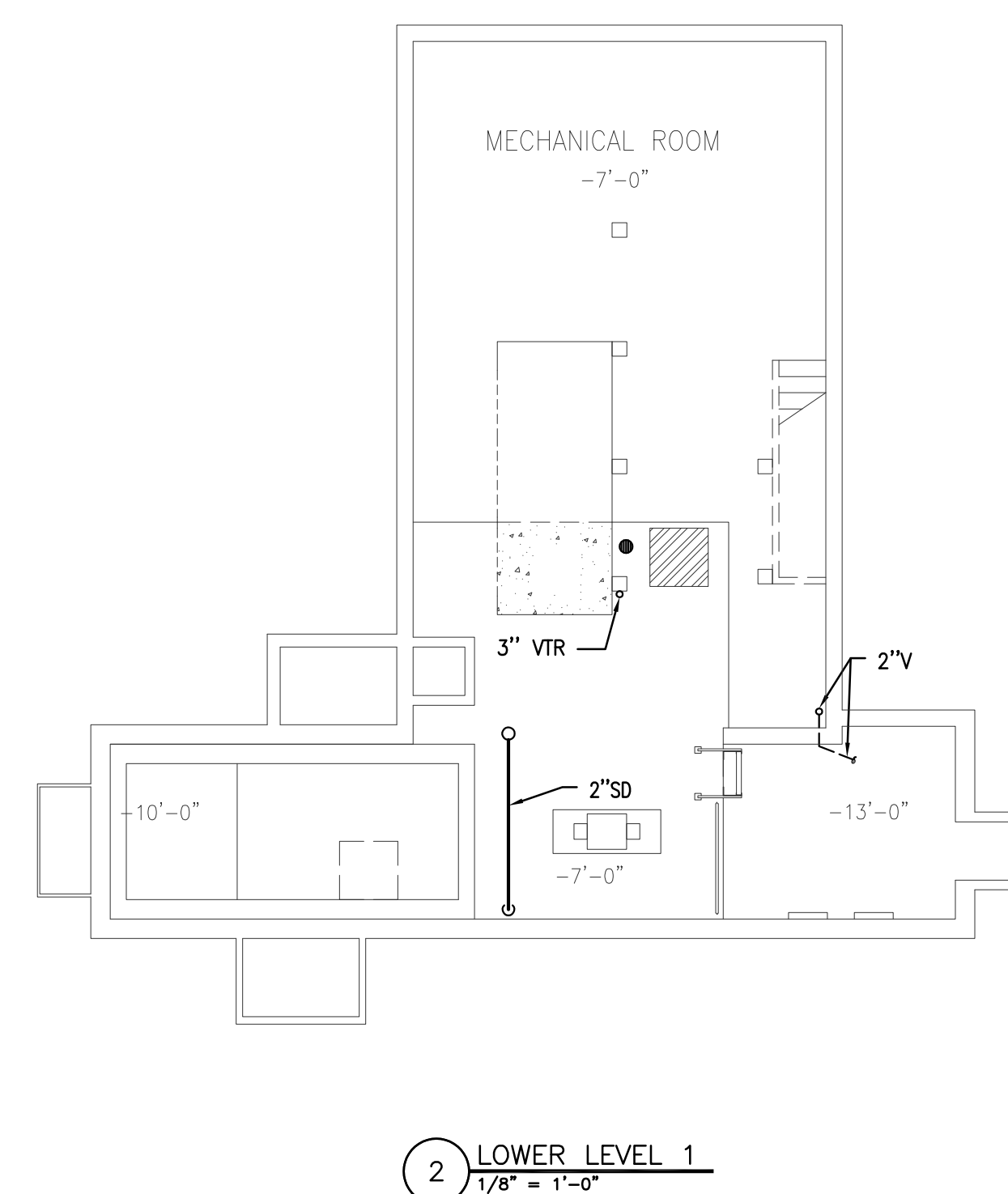
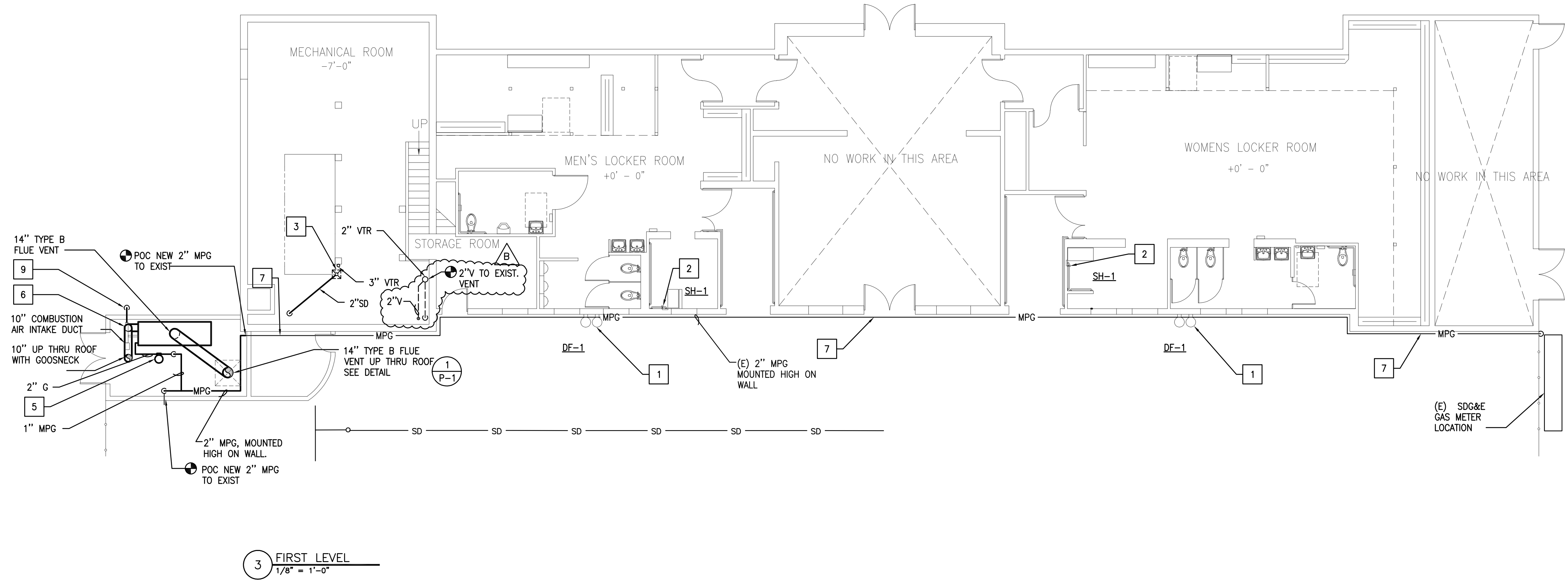
P-100

BUD KEARNS AQUATIC COMPLEX IMPROVEMENTS
PLUMBING FLOOR PLAN - DEMOLITION

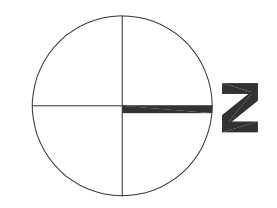
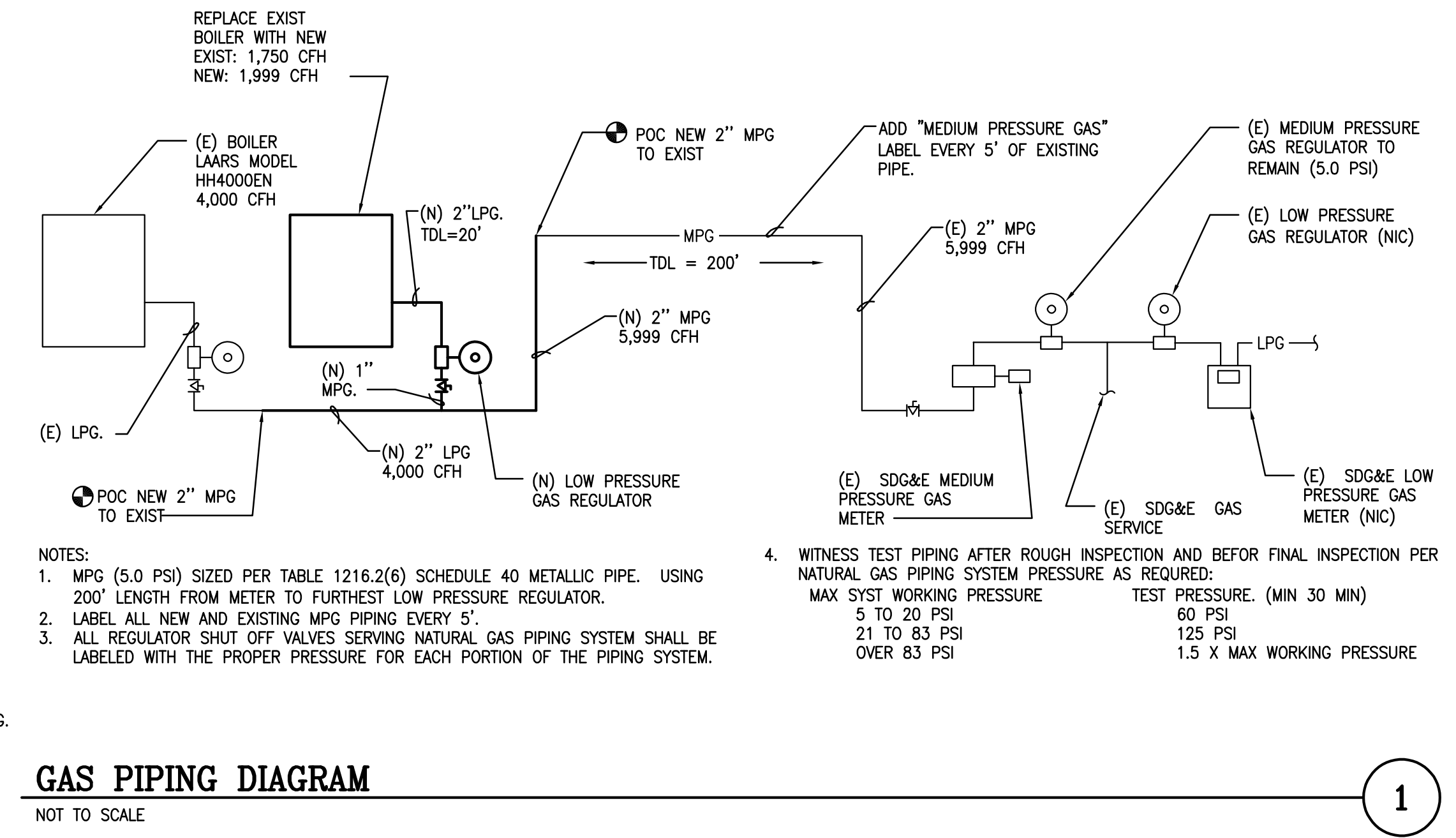
SPEC. NO.: 1815A 	CITY OF SAN DIEGO, CALIFORNIA PUBLIC WORKS DEPARTMENT 40 out of 54	WBS S - 17000
APPROVED: FOR CITY ENGINEER JASON GRANI PRINT NAME	DATE: 11/14/2019 DATE: C77208 RCE#	SUBMITTED BY: MICHELLE GARCIA-QUILICO PROJECT MANAGER CHECKED BY: DAVID SENAH PROJECT ENGINEER
DESCRIPTION ORIGINAL	BY PWA	APPROVED DATE 11/14/19
17033 08-27-2019	ADDENDUM B PWA	DATE 1/24/20
CONTRACTOR INSPECTOR	DATE STARTED DATE COMPLETED	40665 - 40 - D CCS27 COORDINATE 1850-6288 CCS83 COORDINATE

BENDER DEAN ENGINEERING
 444 Camino Del Rio South
 Suite 201
 San Diego, CA 92108-3547
 Phone: (619) 704-1900 Fax: (619) 255-1260

BUD KEARNS AQUATIC COMPLEX IMPROVEMENTS



- KEYNOTES**
- 1 INSTALL NEW DOUBLE DRINKING FOUNTAIN AT LOCATION OF EXISTING SINGLE DRINKING FOUNTAIN. REMOVE STUCCO IN AREA OF WORK. RE-PIPE WATER AND WASTE IN WALL TO ACCOMMODATE NEW FIXTURE. REPAIR STUCCO AND INSTALL RETROFIT WALL PLATE ON EXTERIOR OF WALL. INSTALL NEW FIXTURE PER MANUFACTURERS REQUIREMENTS.
 - 2 REPLACE EXISTING HAND/WALL SHOWER HEAD. REMOVE EXISTING BACK TO WALL AND REPLACE WITH NEW SUPPLY ELBOW, HOSE, SHOWER HEAD AND MOUNTING BAR.
 - 3 CONNECT 2" STORM DRAIN TO EXISTING ROOF DRAIN
 - 4 REPLACE EXIST 4" WASTE AND 2" WASTE ABOVE AND BELOW GRADE. CONNECT TO NEW FLOOR DRAIN AND NEW 8" WASTE. RUN NEW 2" VENT UP TO FIRST LEVEL.
 - 5 GAS PRESSURE REGULATOR, MAXITROL 210D, 1" X 1" 2,000 CFH, OUTLET PRESSURE 9" W.C., PROVIDE VENT LIMITER FOR INDOOR USE. INSTALL A MINIMUM OF 10 PIPE DIAMETERS FROM BOILER INLET.
 - 6 NEW 10" COMBUSTION AIR DUCT FROM BOILER INTAKE CONNECTION UP THROUGH ROOF. PROVIDE GOOSENECK ON ROOF WITH BIRD SCREEN.
 - 7 LABEL ALL NEW AND EXISTING MPG PIPING EVERY 5'.
 - 8 NEW 8"W BELOW GRADE. CONNECT TO EXISTING WASTE BELOW GRADE. VIDEO CAMERA REMAINDER OF 8" PIPE AND REPORT ANY ISSUES TO OWNER.
 - 9 PIPE PRESSURE RELIEF VALVE TO OUTSIDE OF BUILDING. PIPE SHALL BE FULL SIZE FROM BOILER TO DISCHARGE. DISCHARGE PIPE SHALL DISCHARGE INDEPENDENTLY BY GRAVITY OUTSIDE OF THE BUILDING WITH THE END OF THE PIPE NOT EXCEEDING 2 FEET AND NOT LESS THAN 6 INCHES ABOVE THE GROUND AND POINTING DOWNWARDS.



BENDER DEAN ENGINEERING
444 Camino Del Rio South
Suite 201
San Diego, CA 92108-3547
Phone: (619) 704-1900 Fax: (619) 255-1260

SPEC. NO.: 1815A	CITY OF SAN DIEGO, CALIFORNIA PUBLIC WORKS DEPARTMENT 41 out of 54		WBS \$ - 17000
	APPROVED: FOR CITY ENGINEER JASON GRANI PRINT NAME	DATE 11/14/2019 C77208 RCE#	SUBMITTED BY MICHELLE GARCIA-QUILICO PROJECT MANAGER CHECKED BY DAVID SENAH PROJECT ENGINEER
	DESCRIPTION	BY	APPROVED
ORIGINAL	PWA		DATE FILMED 11/14/19
ADDENDUM B	PWA		DATE FILMED 1/24/20
CONTRACTOR INSPECTOR	DATE STARTED	DATE COMPLETED	COORDINATE CCS27 COORDINATE 1850-6288 CCS83 COORDINATE
			40665 - 41 - D

Bid Results

Bidder Details

Vendor Name Marcon Engineering, Inc.
Address 876 N Broadway
 Escondido, CA 92025
 United States
Respondee Carson Allen
Respondee Title Estimator
Phone 760-871-0477 Ext. 31
Email carson.allen@marconeng.com
Vendor Type LAT,FEM,MBE,CADIR,WBE,WOSB,PQUAL,Local
License # 631811
CADIR 1000029618

Bid Detail

Bid Format Electronic
Submitted February 5, 2020 1:54:44 PM (Pacific)
Delivery Method
Bid Responsive
Bid Status Submitted
Confirmation # 200759
Ranking 0

Respondee Comment

Buyer Comment

Attachments

File Title	File Name	File Type
Contractors Certificate	Cert Pending.pdf	CONTRACTOR'S CERTIFICATION OF PENDING ACTIONS
Mandatory Enclosure	Mandatory Disclosure.pdf	MANDATORY DISCLOSURE OF BUSINESS INTERESTS FORM
Debarment	Debarment .pdf	DEBARMENT AND SUSPENSION CERTIFICATION
Bid Bond	Bid Bond.pdf	Bid Bond

Line Items

Type	Item Code	UOM	Qty	Unit Price	Line Total	Comment
Main Bid						
1	Bonds (Payment and Performance)					
	524126	LS	1	\$22,510.00	\$22,510.00	
2	Building Permits (EOC Type I)					
	236220	AL	1	\$15,000.00	\$15,000.00	
3	Lead Paint Handling, Abatement, Removal, Transportation and Disposal (EOC Type I)					
	238990	AL	1	\$6,000.00	\$6,000.00	

Bid Results

Type	Item Code	UOM	Qty	Unit Price	Line Total	Comment
4	Dewatering Permit and Discharge Fees (EOC Type I)					
	237110	AL	1	\$1,000.00	\$1,000.00	
5	Dewatering Non-Hazardous Contaminated Water (EOC Type I)					
	237110	AL	1	\$10,000.00	\$10,000.00	
6	Mobilization					
	236220	LS	1	\$55,000.00	\$55,000.00	
7	Field Orders (EOC Type II)					
		AL	1	\$35,300.00	\$35,300.00	
8	Excavate and Export (Unclassified; Cubic Yard) (EOC Type I)					
	237310	AL	1	\$6,000.00	\$6,000.00	
9	WPCP Development					
	541330	LS	1	\$1,000.00	\$1,000.00	
10	WPCP Implementation					
	236220	LS	1	\$4,280.00	\$4,280.00	
11	Specialty Inspection Paid For By the Contractor (EOC Type I)					
	236220	AL	1	\$8,000.00	\$8,000.00	
12	Construction of Bud Kearns Aquatic Complex Improvements					
	236220	LS	1	\$2,084,798.00	\$2,084,798.00	
				Subtotal	\$2,248,888.00	
				Total	\$2,248,888.00	

Subcontractors

Name & Address	Description	License Num	CADIR	Amount	Type
California Commercial Pools, Inc. 2255 E. Auto Centre Drive Glendora, CA 91740 United States	Swimming Pools	415172	1000001406	\$979,500.00	PQUAL
P. Teixeira Construction, Inc. 13675 Highway 8 Business El Cajon, CA 92021 United States	Demolition deck and Earthwork	484396	1000005524	\$53,400.00	ELBE
HPS Mechanical, Inc. 3100 E. Belle Terrace Bakersfield, CA 93307 United States	Site Utilities	793014	1000001107	\$40,359.00	CADIR,PQUAL
Legend Fence Corp 3559 Vista Ave Lemon Grove, CA 91945 United States	Fencing	787570	1000001232	\$75,000.00	LAT,MBE,SDB
Hutchison Mechanical 14769 El Monte Rd. Lakeside, CA 92040 United States	HVAC	976480	1000037202	\$116,500.00	CADIR,CAU,ELBE,M ALE
Dirt Engineering 970 W Valley Parkway, 661 Escondido, CA 92025 United States	Demolition Building (exclude deck)	898534	1000058508	\$60,000.00	ELBE

Bid Results

Name & Address	Description	License Num	CADIR	Amount	Type
Moor Electric, Inc. 1244 Manchester Street National City, CA 91950 United States	Electric	797985	1000002598	\$54,877.00	AFR,MALE,ELBE,DB E,HUBZ,MBE,CADIR ,SDB